



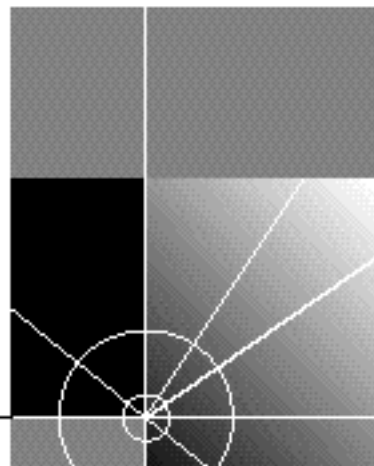
# 622 Mbps ATM Interface Module

## User Guide

<http://www.3com.com/>

Part No. DUA3762-1AAA01  
Published October 1997

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# ABOUT THIS GUIDE

The 622 Mbps ATM Interface User Guide provides all the information you need to install and set up the 622 Mbps ATM Interface Module in your CoreBuilder 7000HD switch unit. This guide provides an overview of the 622 Mbps ATM Interface Module, step-by-step installation and power-up procedures, theory of operation, and how to configure and manage the unit.



*If the information in the release notes shipped with your 622 Mbps ATM Interface Module differs from the information in this guide, please follow the release notes.*

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## Who Should Use This Guide

This guide is intended for the system administrator, network equipment technician, or network manager who is responsible for installing and managing interface cards designed for operation with network hardware such as CoreBuilder 7000HD ATM switches. It assumes a working knowledge of network operations and familiarity with communications protocols that are used in networks. No prior knowledge of 3Com's CoreBuilder networking equipment is necessary to understand this manual.

## Organization

This guide is organized so that you can go directly to the information you need.

The guide is divided into two parts corresponding to the two possible configurations of the 622 Mbps ATM Interface Module in a CoreBuilder 7000HD switch:

- Part I covers the 622 Mbps ATM Interface Module and its installation in a CoreBuilder 7000HD 8-Port Board ATM Interface Card.
- Part II covers the 622 Mbps ATM Interface Module and its installation in a CoreBuilder 7000HD ATM Interface Carrier Module.



*The 622 Mbps ATM Interface Module itself is the same for both configurations.*

## **Chapter 1: Introduction**

This chapter contains an overview of the 622 Mbps ATM Interface Module and its functions and features.

## **Part I: 622 Mbps ATM Interface Module in an 8-Port Board**

### **Chapter 2: Overview**

This chapter contains an overview of the 622 Mbps ATM Interface Module in an 8-Port Board Module and its functions and features as well as a front panel view.

### **Chapter 3: Installation and Power-up**

This chapter contains the information you need to install and power-up the 622 Mbps ATM Interface Module as well as a description of system states and LED indicators.

### **Chapter 4: Configuration and Fast Setup**

This chapter describes the method of configuring the 622 Mbps ATM Interface Module ports and setting up the network connections.

### **Chapter 5: ATM-Layer Processing**

This chapter describes the principles underlying the operation of the 622 Mbps ATM Interface Module in an 8-Port Board, including ATM-layer processing and flow control.

## **Part II: 622 Mbps ATM Interface in an ATM I/F Carrier**

### **Chapter 6: Overview**

This chapter contains an overview of the 622 Mbps ATM Interface Module in an ATM Interface Carrier Module and its functions and features as well as a front panel view.

### **Chapter 7: Installation and Power-up**

This chapter contains the information you need to install and power-up the unit as well as a description of system states and LED indicators.

## Chapter 8: Configuration and Fast Setup

This chapter describes the method of configuring the 622 Mbps ATM Interface ports and setting up the network connections.

## Chapter 9: ATM-Layer Processing

This chapter describes the principles underlying the operation of the 622 Mbps ATM Interface Module in a ATM Interface Carrier Module including ATM-layer processing and flow control.

## Appendices

This guide contains the following appendices:

- Appendix A: 622 Mbps ATM Interface Module Specifications.
- Appendix B: Troubleshooting.
- Appendix C: Technical Support Information.




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### Guide Conventions

Table 1 lists the icons and typographical conventions used in this guide.

Notice icons indicate statements that you need to read before continuing in the guide. Table 1 describes these icons.

**Table 1** Notice Icons

Icon	Type	Description
	Information Note	Information notes call attention to important features or instructions.
	Caution	Cautions alert you to personal safety risk, system damage, or loss of data.
	Warning	Warnings alert you to the risk of severe personal injury.

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### Related Documentation

The complete documentation for the 622 Mbps ATM Interface Module, the 8-Port Board ATM Interface Module, and the CoreBuilder 7000HD Switch is shown in Table 2.

**Table 2** Related Documentation

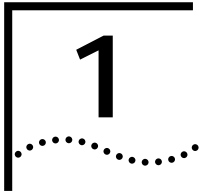
Document	3Com Part Number
622 Mbps ATM Interface User Guide	DUA3762-1AAA01
622 Mbps ATM Interface Release Notes	
8-Port Board ATM Interface User Guide	DUA3708-0AAA01
8-Port Board ATM Interface Release Notes	
CoreBuilder 7000 Installation and Setup Guide	DUA370BAAA02
CoreBuilder 7000 Operation Guide	DUA370AAAA02
CoreBuilder 7000 Administration Guide	DUA370CAA02
CoreBuilder 7000HD Release Notes	

Table 3 describes important information in the 622 Mbps ATM Interface Module documentation to help you locate the information you need.

**Table 3** 622 Mbps ATM Interface Module Documentation Road Map

If you want to...	Read...
Learn about new features or bug fixes in the 622 Mbps ATM Interface Module software.	Release Notes
Learn about changes to the 622 Mbps ATM Interface Module documentation ( <i>User Guide</i> ).	Release Notes
Get an overview of the 622 Mbps ATM Interface Module, including system components.	User Guide
Learn about various configurations in which you can install your 622 Mbps ATM Interface Module.	User Guide
Install and power up your 622 Mbps ATM Interface Module.	User Guide
Learn about how you administer and manage the 622 Mbps ATM Interface Module.	User Guide
Learn about ATM processing in the 622 Mbps ATM Interface Module.	User Guide
Find out what type of configuration tasks you can perform on the 622 Mbps ATM Interface Module.	User Guide
Quickly set up your 622 Mbps ATM Interface Module.	User Guide
Get assistance.	<i>Technical Support Appendix</i> in any guide

Other related documentation includes guides for Transcend™ Manager, a 3Com network management application, the SuperStack II 2700 Installation & Setup, Administration, and Operation Guides and the CoreBuilder 7X00 Interface Card User Guides.



# INTRODUCTION

This chapter contains an introduction to the major characteristics and capabilities of the 622 Mbps ATM Interface Module (referred to below as the 622 Module). The topics covered in this chapter include:

- Overall description of the 622 Module
- 622 Module capabilities
- Key features
- Typical application

---

## Overall Description of the 622 Module

The 622 Module is an interface module for the CoreBuilder 7000HD switch unit which can be installed as a pluggable module in either the 8-Port ATM Interface Card or the ATM Interface Carrier Card of the CoreBuilder 7000HD switch. In both configurations, two 622 Modules can be installed.

### A Look at the 622 Module

Remove the 622 Module from its packaging. The package should contain:

- One 622 Module
- Two flat cables
- Optical interface panel
- LEDs panel
- The 622 Mbps ATM Interface *User Guide*

If any of these items are missing, please contact your supplier.

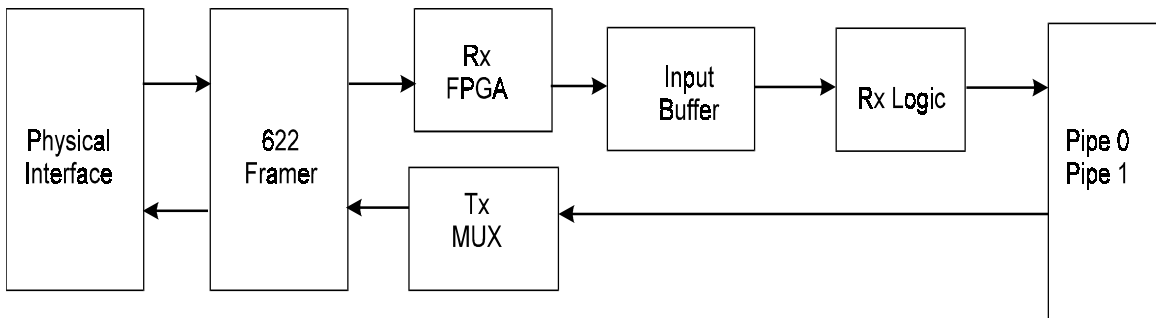
The 622 Module appears as in Figure 1-1.



**Figure 1-1** The 622 Module with panels

### Data Flow through the 622 Module

The data flow sequence in the 622 Module is illustrated in Figure 1-2.



**Figure 1-2** Data Flow in the 622 Module

### Incoming Data

- 1 Incoming data enters the physical interface at 622 Mbps.
- 2 The 622 Framer extracts the cells from the overhead data.
- 3 The Rx FPGA determines on which pipe the data will be received.
- 4 The data is stored in the input buffer until it can be released.
- 5 Using the Rx logic, data is transformed into the 8-Port Board and ATM I/F Carrier format.
- 6 The data passes through the connector to the 8-Port Board and ATM I/F Carrier.

The 622 Framer and the Rx FPGA compute statistics for the 622 Module.

## Outgoing Data

Outgoing data from the two pipes is multiplexed by the Tx MUX and transmitted out on the physical interface.

---

### 622 Module Capabilities

The 622 Module provides the following capabilities:

- Flexible, multiple ATM connectivity
- Increased data flow capacity
- Traffic management to prevent loss of high priority data

### ATM Connectivity

The main purpose of the 622 Module is to provide high-speed ATM connectivity that allows CoreBuilder 7000HD switch units to function efficiently with other CoreBuilder 7000HD switch units, switches from other vendors, high bandwidth NICs and edge devices. Major applications of the 622 Module are to build a network core and to provide fast connections of up to 622 Mbps to a network core (see "ATM Network Core" on page 1-5).

#### *In an 8-Port Board*

A major application of the 622 Module in an 8-Port Board is to provide a high-speed connection of a CoreBuilder 7000HD switch unit down to an ATM core or backbone while concentrating four channels of 155 Mbps each into a single channel of 622 Mbps.

#### *In a ATM I/F Carrier Board*

A major application of the 622 Module in a ATM I/F Carrier is to allow a 622 Mbps non-blocking connection of a CoreBuilder 7000HD switch unit with other CoreBuilder 7000HD switch units to form an ATM core or backbone.

### 622 Module Configurations

Possible configurations of the 622 Module which can be installed in the 8-Port Board or the ATM I/F Carrier are:

- 622-MM - Fiber Optics Multimode
- 622-SM-SR - Fiber Optics Single Mode, Short Reach

Details of these configurations are shown in Table 1-1.



**Table 1-1** 622 Module Configurations in 8-Port Board or ATM I/F Carrier

Module Type	Number of Ports	Rate (Mbps)	Granularity	3Com Part Number
622-MM	2	622	1	3C37080
622-SM-SR	2	622	1	3C37081

### Interface Functionality

The interface parameters of the 622 Module are shown in Table 1-2.

**Table 1-2** 622 Module Interface Parameters

Parameter	Values
Framing	SONET STS-12c SDH STM-4c NRZ line coding
Media	Fiber Optics Multimode 6 dB power budget - 800 m  Fiber Optics Single Mode (Short reach), 18 dB power budget - 15 Km  Fiber Optics Single Mode (Long reach), 25 dB power budget -60 Km
Connectors	Duplex SC connector for fiber
Clocking	Looped timing from the received data stream  Centralized - 8 KHz reference  Free run  Clock accuracy 20 PPM
Buffers	3Kcell/port per 310 MHz
Statistics/Alarms	LOS, LOF, LOP, FEBE, AIS, FERF, Yellow Alarm, BIP-24, BIP-8, HCS
Compliance	ATM Forum STS-12c, UNI v3.1, ATM Forum 95-0128-Feb. 1995, ITU-T, I.432, ANSI T1E1.2/93-020, T1S1/92-185, ITU-T G.957, Bellcore TR-NWT-000253, SONET MIB



*The 622 Module will not operate in a CoreBuilder 7000 unit in which either a 4-Port Board Unit or a 7200 Interface Card is installed.*

Key Features	The following are key features of the 622 Module:	
■ VPI/VCI range support	See Table 1-3	
■ WAN support	– Clock synchronization – Peak cell rate control	
■ Buffer size	– Rx low priority – Rx high priority	
■ TD	Tail Drop	

Table 1-3 VPI/VCI Range Support

VPI bits	VPI Range	VCI bits	VCI Range	Purpose
0	0	12	4096	Adapter connectivity
1	2	11	2048	For most UNI
2	4	10	1024	For most UNI
3	8	9	512	For most UNI
4	16	8	256	VP switching/tunnelling
5	32	7	128	VP switching/tunnelling

Typical Application of the 622 Module	The 622 Module installed in a CoreBuilder 7000HD high-density switch unit will provide advantages in many different locations and configurations.
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ATM Network Core	Figure 1-3 shows the 622 Module used in a switched Ethernet network with an ATM network core.
------------------	---

High-speed Full-redundancy ATM Network Core

This scenario displays how installing the 622 Module in an ATM I/F Carrier provides a high-speed connection between CoreBuilder 7000HD switch units to form an ATM core or backbone. The core consists of three CoreBuilder 7000HD switch units 1, 2, and 3 each with ATM I/F Carrier Boards installed.

Each ATM I/F Carrier Board has two 622 Modules installed, making it possible to doubly connect the three switch units to form a high-speed, full-redundancy network core.

### **Fast Connections to Network Core and External Devices**

This scenario also displays how the 622 Module in an 8-Port Board provides the fast connection of a CoreBuilder 7000HD switch unit down to an ATM core or backbone.

Switch 1 of the core is connected to an 8-Port Board in CoreBuilder 7000HD switch unit 4 through 622 Modules, providing a fast connection between it and the network core. Switch unit 4 is connected by OC-3 lines to four Switch 2700 edge devices 5.

Switch 2 of the core is connected to an 8-Port Board in CoreBuilder 7000HD switch unit 6 through 622 Modules, again providing a fast connection to the core. Switch 6 is connected by OC-3 lines to four CoreBuilder 7000 units 7.

Switch unit 3 of the core is connected via its 622 Modules to a set of servers 8 and a multimedia connection 9. Four OC-12 lines provide a fast connection between the core and these external devices.

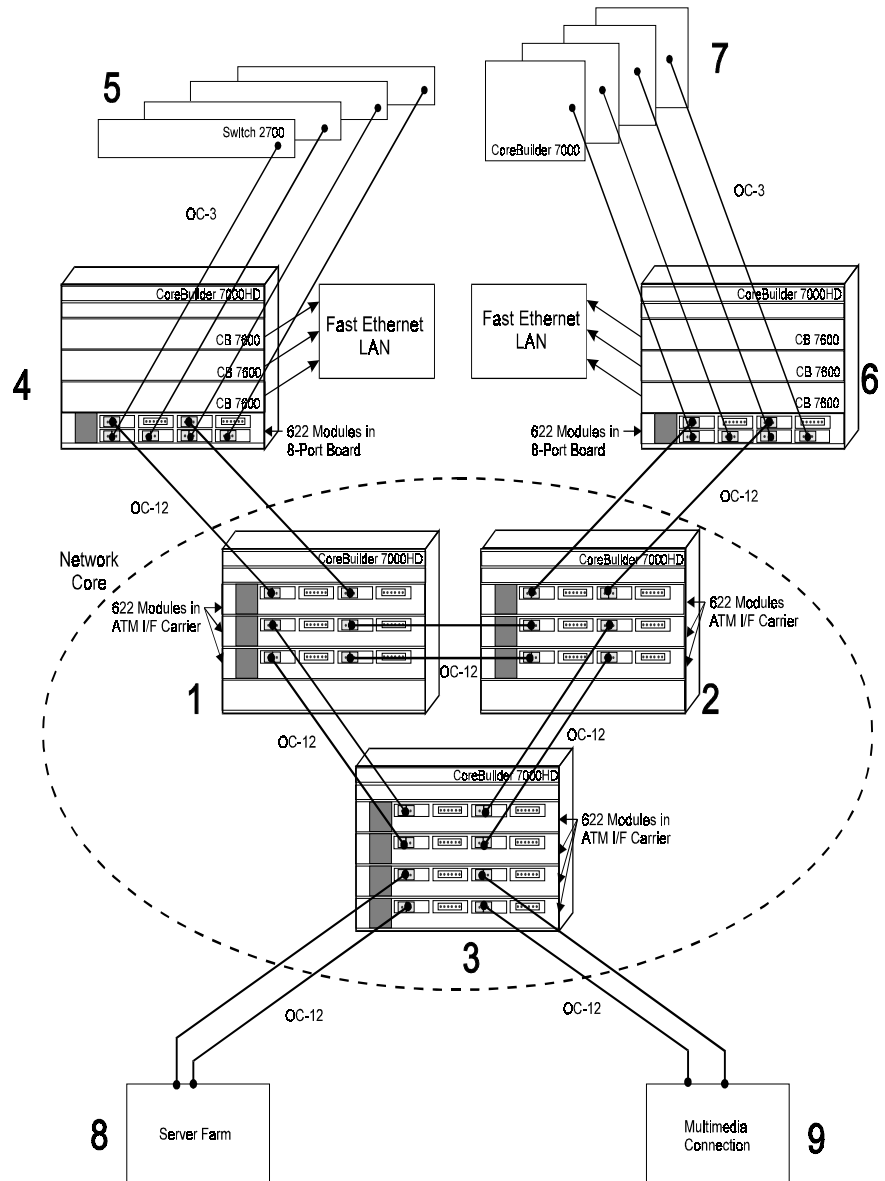
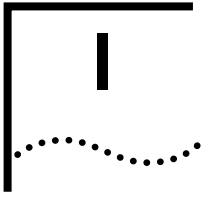
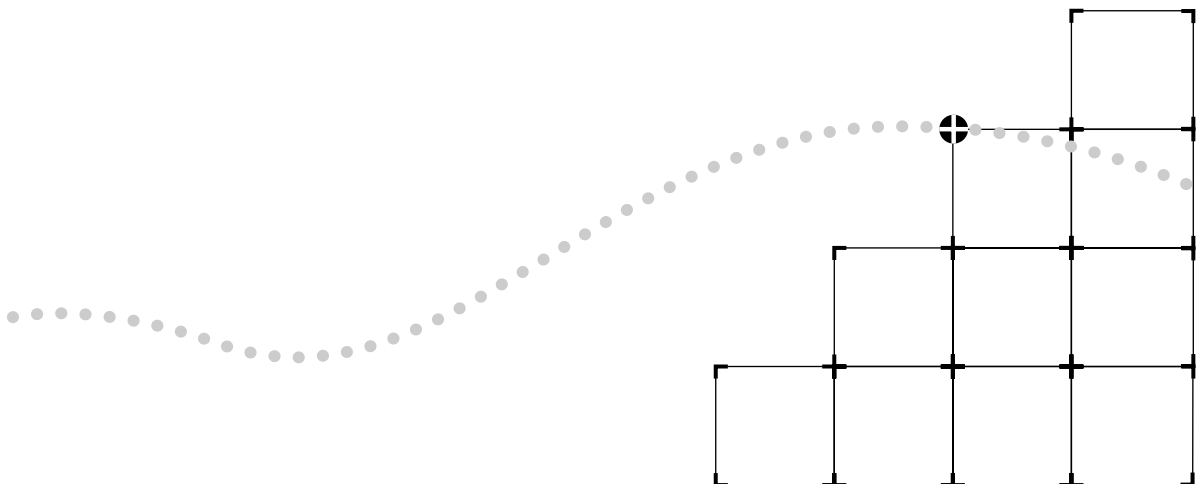


Figure 1-3 Switched Ethernet Network with ATM Core



# 622 MBPS ATM INTERFACE MODULE IN AN 8-PORT BOARD

- Chapter 2 Overview
- Chapter 3 Installation and Power-up
- Chapter 4 Configuration and Fast Setup
- Chapter 5 ATM-Layer Processing



# 2

## OVERVIEW

This chapter contains an overview of the major characteristics and capabilities of the 622 Mbps ATM Interface Module (referred to below as the *622 Module*) when installed in an 8-Port Board ATM Interface Module (referred to below as the *8-Port Board*). The topics covered in this chapter include:

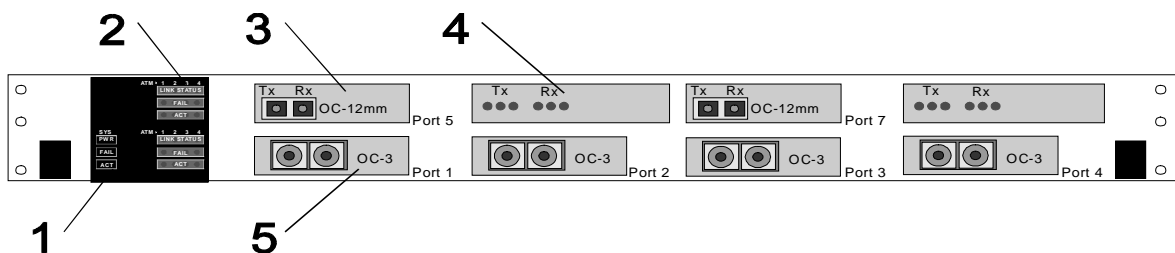
- Overall description of the unit
- Capabilities and technological highlights

### About the 622 Module

The 622 Module is an interface module for the CoreBuilder 7000HD switch unit. It is installed as a pluggable module in the 8-Port Board ATM Interface Card of the CoreBuilder switch. Two 622 Modules can be installed on each 8-Port Board ATM Interface Card.

### Front Panel Layout

The front panel of the 8-Port Board with two 622 Modules installed is shown in Figure 2-1.



**Figure 2-1** 8-Port Board Front Panel with Two 622 Modules Installed

The 622 Module is designed to occupy a pair of ATM ports on the upper tier of ports of the 8-Port Board, either ports 5-6 or ports 7-8. Referring to Figure 2-1, the left port of the pair has an optical interface (3) and the right port has a set of 622 LED indicators (4). Two 622

Modules are shown installed, one occupying ports 5-6 and the other occupying ports 7-8 (note that in Figure 2-1 the identifiers for ports 6 and 8 are covered by the label plates). For an explanation of the functionality of the 622 LEDs see “622 Module LEDs” on page 3-13.

The lower tier of ATM ports, 1-4, holds four fixed on-board OC3 ATM interfaces (5).

The LED indicators on the left side of the front panel show the 8-Port Board’s operational status, including system LEDs (1) and ATM LEDs (2) (see “System States and LEDs” on page 3-11). The functionality of these LEDs is unchanged by the addition of the 622 Modules except for the upper tier of ATM LEDs. When a 622 Module is installed on ports 5-6, ATM LED #5 is active and LED #6 is disabled; when a 622 Module is installed on ports 7-8, ATM LED #7 is active and LED #8 is disabled



*In order to allow the installation of a 622 Module in an 8-Port Board, be sure to order the 8-Port Board in one of the following configurations. These configurations accept user-installed pluggable interfaces on the upper tier of ports.*

**Table 2-1** Versions of 8-Port Board Suitable for Installation of 622 Module

8-Port Board Version	3Com Part No.	Installation of 622 Module
4-port MM	3C37152	Adding to unoccupied ports
4-port SM	3C37153	Adding to unoccupied ports
8-port MM	3C37158	Replacing occupied ports
8-port SM	3C37159	Replacing occupied ports



*Note that if you wish to install a 622 Module in ports 5-6 and OC-3 Modules in ports 7 and 8 (or vice versa) you can only use an OC-3 Module of type T1.*

## 622 Module Capabilities

The 622 Module provides the following capabilities:

- Flexible, multiple ATM connectivity
- Increased data flow capacity
- Traffic management to prevent loss of high priority data

**Data Flow Capacity**

The ATM processing unit of the 8-Port Board multiplexes the incoming data from each vertical pair of 155 Mbps ATM ports into a single ATM data channel called a pipe which carries the data into the CoreBuilder 7000HD. The 8-Port Board has 4 pipes, each of which can handle 310 Mbps, making a total throughput of 1.25 Gbps for the entire card. This throughput remains the same when a 622 Module is installed (see “De-multiplexing Input Data from 622 Ports” on page 5-2).

**Burst Transmissions**

The 622 Module in an 8-Port Board can handle burst transmissions at the full 622 Mbps rate using special traffic management mechanisms (see “Handling Burst Transmissions” on page 5-6).

**Traffic Management**

The 622 Module, in coordination with the 8-Port Board, features several different methods of preventing loss of high priority data including:

- Priority Input Buffers (on the 622 Module)
- Tail Drop (TD) (on the 622 Module)
- Priority Output Buffers (on the 8-Port Board)
- Back Pressure Cell Storage (on the 8-Port Board)
- Early Packet Drop (EPD) (on the 8-Port Board)

For further information, see “Traffic Management in the 622 Module” on page 5-6.



# 3

## INSTALLATION AND POWER-UP

This chapter contains a description of the installation, power-up and system states of the 622 Module. The topics covered in this chapter include:

- Safety precautions
- Installation of the 622 Mbps ATM Interface Module into an 8-Port Board ATM Interface Card of the CoreBuilder 7000HD switch unit
- Connecting to network devices
- 622 Module System States and LED indicators
- Power-up procedure

---

## Safety Precautions



*Read the following safety precautions carefully to reduce the risk of electric shock and fire.*

*When handling replacement parts, 3Com recommends that you always use a wrist strap connected to a proper ground. This helps prevent the module from being damaged by electrostatic discharge. Additionally, when not in use, the module should be stored in an antistatic bag.*

*If the system is powered on when you are replacing a module, do not insert any metal objects, such as a screwdriver or a finger with jewelry, in the open slot. This could cause burns or other bodily harm, as well as system damage.*

- All servicing should be undertaken ONLY by qualified service personnel.
- DO NOT operate the unit in a location where the maximum ambient temperature exceeds 40 degrees C.
- Ensure that the chassis ventilation openings in the unit are NOT BLOCKED.
- DO NOT plug in, turn on or attempt to operate an obviously damaged unit.

---

## Mesures de sécurité



*Lire attentivement les mesures de sécurité afin de réduire les risques d'électrocution et d'incendie.»*

*Lors de la manipulation des pièces de rechange, 3 Com recommande de toujours utiliser une bande attachée au poignet et reliée à la terre. Cela aidera à éviter que la pièce ne soit endommagée par une décharge électrostatique. De plus, lorsqu'il n'est pas utilisé, le module doit être conservé dans un emballage antistatique.*

*Si le système est alimenté lors de l'installation ou du remplacement d'un module, ne jamais insérer d'objet métallique tel qu'un tourne-vis ou un doigt portant un bijou dans la fente. Cela est susceptible de provoquer brûlures ou autres dommages corporels, et d'endommager le système.*

- Le service après-vente ne devra être effectué que par un personnel qualifié.
- Ne pas faire fonctionner l'unité dans un endroit où la température ambiante maximale dépasse 40 degrés C.
- S'assurer que les orifices de la ventilation du châssis de l'unité ne sont pas obstrués.
- Ne jamais essayer de brancher, allumer ou faire fonctionner une unité apparemment endommagée.

---

## Vorsichtsmaßnahmen



*Lesen Sie die folgenden Vorsichtsmaßnahmen sorgfältig, um das Risiko von Stromschlag oder Brandgefahr zu vermeiden.*

*Wenn Sie Ersatzteile handhaben, benutzen Sie immer ein Band am Handgelenk, daß gut geerdet ist. Das hilft vermeiden, daß das Ersatzteil durch elektrostatische Entladung beschädigt wird. Darüber hinaus sollte ein Modul, wenn nicht benutzt, in einem antistatischen Beutel aufbewahrt werden.*

*Steht das System unter Strom, wenn sie ein Modul installieren oder auswechseln, führen Sie keine Metallgegenstände, wie einen Schraubenzieher oder einen Finger mit Schmuck in den offenen Schlitz ein. Das könnte zu Verbrennungen oder anderen Körperschäden führen, sowie auch zu Schäden am System.*

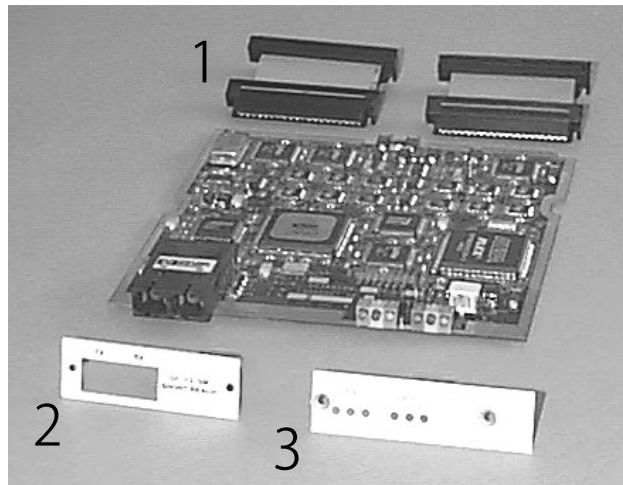
- Jede Wartung sollte NUR von befugtem Wartungspersonal durchgeführt werden.
- Nehmen Sie das Gerät NICHT in Betrieb, falls die Temperatur der Umgebung 40 Grad C übersteigt.
- Gehen Sie sicher, daß die Lüftungsöffnungen am Gehäuse NICHT BLOCKIERT sind.
- Eine offensichtlich schadhafte Einheit sollte weder angeschlossen, eingeschaltet noch in Betrieb genommen werden.

## Installing the 622 Module

This section describes how to install the 622 Module into an 8-Port Board.

### Interface Kit

The pluggable module interface kit, shown in Figure 3-1, contains the additional components required to install the 622 Module into the 8-Port Board (3C37152) of the CoreBuilder.



**Figure 3-1** Interface Kit Components

The kit consists of the following components:

- Two Flat cables (see 1)
- Interface label plate for optic port (see 2)
- Interface label plate for 622 Module LEDs (see 3)



*The 622 Module will not operate in a CoreBuilder 7000 unit in which either a 4-Port Board Unit or a 7200 Interface Card is installed.*

### Installation Procedure Options

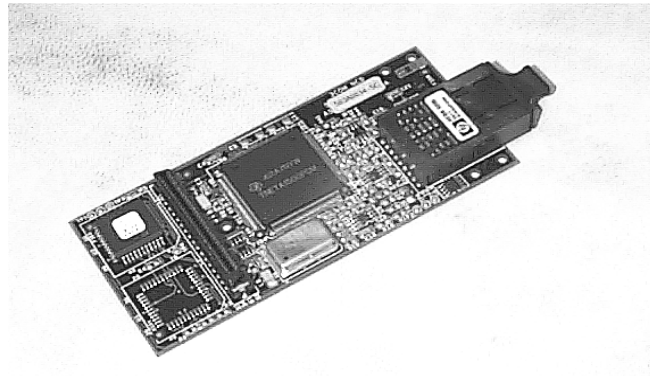
The procedure for installing the pluggable 622 Module into an 8-Port Board of the CoreBuilder 7000HD Switch unit, depends on whether you are replacing existing pluggable modules or not.

- If you are installing the 622 Module into two unoccupied ports begin with the section “Adding a 622 Module to Unoccupied Ports” on page 3-5.

- If you are replacing two existing OC3, DS3 or E3 pluggable modules with one 622 Module begin with the section "Replacing Existing Pluggable Modules" on page 3-9.



*Note that if you wish to install a 622 Module in ports 5-6 together with OC-3 Modules in ports 7 and 8 (or vice versa) you can only use an OC-3 Module of type "B", for example, a Multimode TI Pluggable I/F Module shown in Figure 3-2 (for details about Module types see "Accessing the Interface Card Menu" on page 4-2). There is no restriction on the type of OC-3 Modules that can be used in ports 1-4.*



**Figure 3-2** Multimode TI Pluggable I/F Module

### Adding a 622 Module to Unoccupied Ports

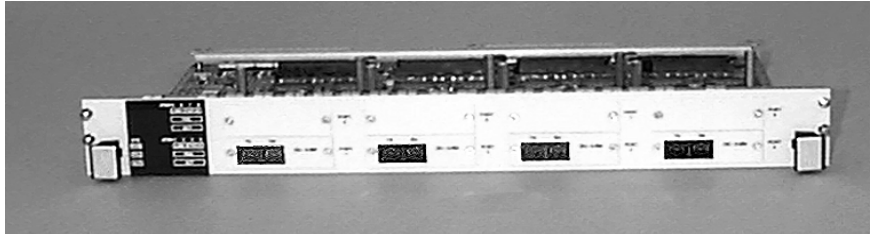
Begin here if you are adding a 622 Module to two unoccupied ports. This section is relevant to 8-Port Board units 4-port MM (3Com PN 3C37152) and 4-port SM (3Com PN 3C37153).

- 1 Remove the 8-Port Board from CoreBuilder chassis and place on horizontal anti-static work surface, component-side up.

Figure 3-3 shows the front panel of the 8-Port Board with ports 5-8 on the upper tier unoccupied.

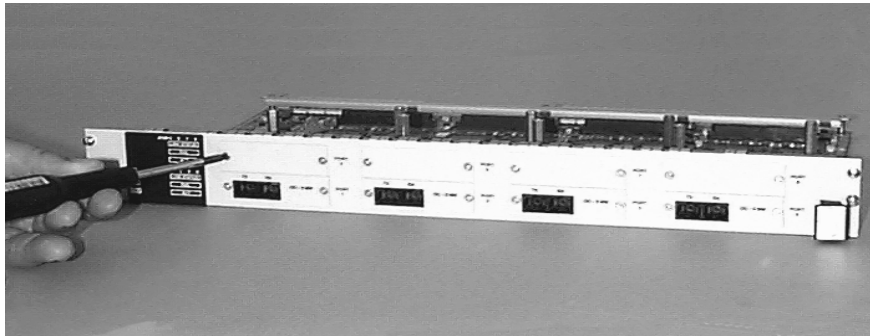


*The 622 Module can be installed in either ports 5-6 or in ports 7-8. In this section the 622 Module is installed in ports 5-6. The procedure is identical for installation in ports 7-8.*



**Figure 3-3** 8-Port Board ready for Mounting of Interface Kit Components

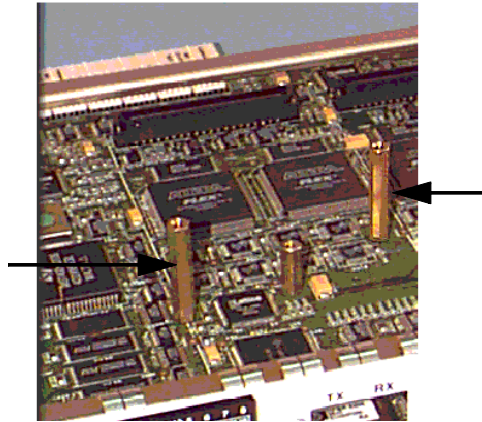
- 2 Remove the two blank plates from the unoccupied ports 5 and 6 on the front panel (see Figure 3-4).



**Figure 3-4** Removing Blank Plate from Unoccupied Port

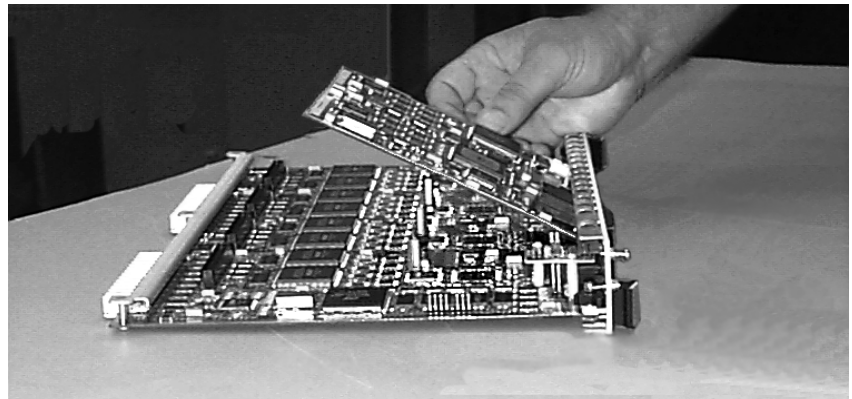
On the board you will see a number of tall and short spacer posts. These posts are provided to hold different types of installed interface cards; the tall posts hold OC-3 pluggable interfaces and the short posts hold 622 Modules. Directly behind each front panel port cutout, there are two tall posts and three short posts. The arrows in Figure 3-5 show the two tall posts behind the port 5 cutout (one of the short posts is shown between them). Note that the tall posts are staggered, the left one being closer to the front panel.

- 3 Remove the four tall posts located behind ports 5 and 6. Each post is held in place by a single screw which is inserted into the bottom of the post from the opposite side of the board. Turn over the board and unscrew these screws.



**Figure 3-5** Removing Tall Spacers

- 4 Holding the 622 Module behind the front panel at an angle as shown in Figure 3-6, carefully insert the optic port into the port 5 cutout and the LEDs into the port 6 cutout and lower the 622 Module so that it rests on the short spacer posts.

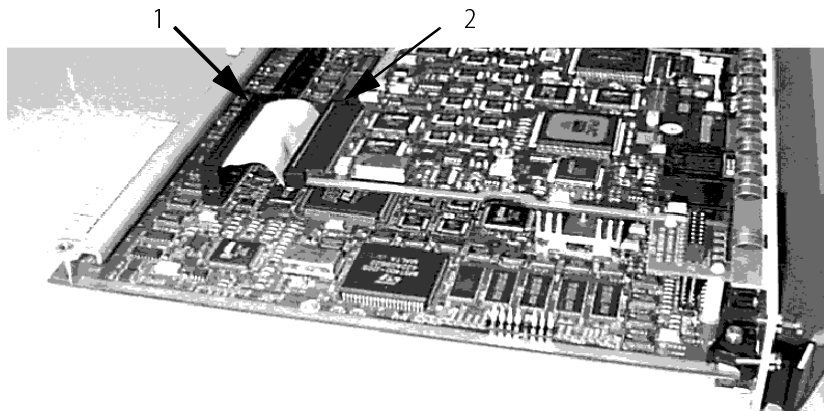


**Figure 3-6** Inserting the 622 Module

- 5 Position the 622 Module on the short posts, and screw in place using a flat washer followed by a spring washer.
- 6 Connect the two flat cables as shown in Figure 3-7. First plug one end of the cable into the cable connector (1) on the 8-Port Board. Then plug the other end of the cable into the edge connector (2) on the rear of the 622 Module. Repeat for the second cable.



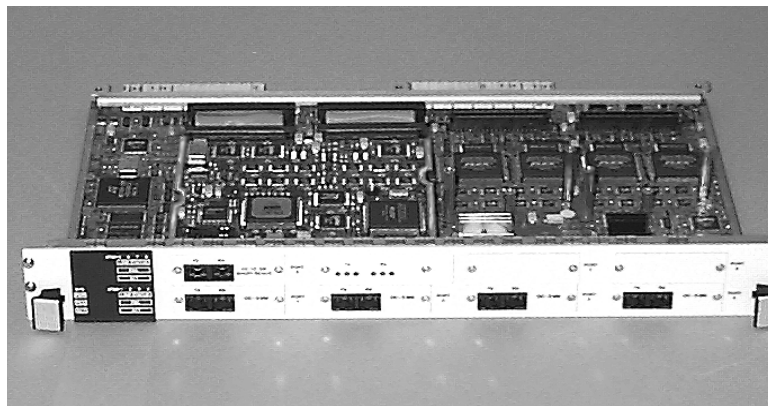
*Note that it is physically possible to plug either end of the flat cable into the cable connector on the 8-Port Board. You will know that you have plugged in the correct end if the cable extends forward from the connector in the direction of the 622 Module, as shown in Figure 3-7. In addition, the red line should be on the right side of the cable when viewed from the front of the 8-Port Board.*



**Figure 3-7** Connecting Flat Cables

- 7 Screw the optic port plate on the port 5 cutout and the LED plate on the port 6 cutout. Align the 622 LEDs with the holes in the LED plate, loosening and tightening the 622 Module screws if necessary.

The installation is now complete. The unit should appear as in Figure 3-8.



**Figure 3-8** 622 Module Installed in an 8-Port Board



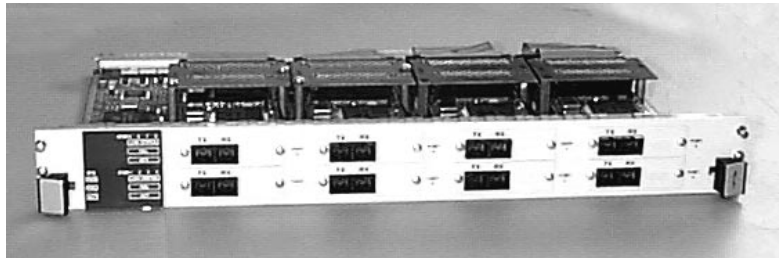
## Replacing Existing Pluggable Modules

Begin here if you are installing the 622 Module in ports already occupied with OC-3 pluggable modules. This section is relevant to 8-Port Board units 8-port MM (3Com PN 3C37158) and 8-port SM (3Com PN 3C37159).

- 1 Remove the 8-Port Board from the CoreBuilder chassis and place on a horizontal work surface, component-side up (see Figure 3-9).



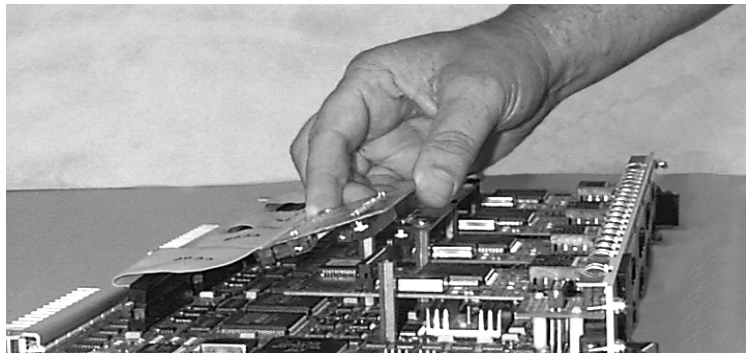
*The 622 Module can be installed in either ports 5-6 or in ports 7-8. In this section the 622 Module is installed in ports 5-6 replacing the OC-3 pluggable modules installed there. The procedure is identical for installation in ports 7-8.*



**Figure 3-9** 8-Port Board ready for Mounting of Installation Kit Components

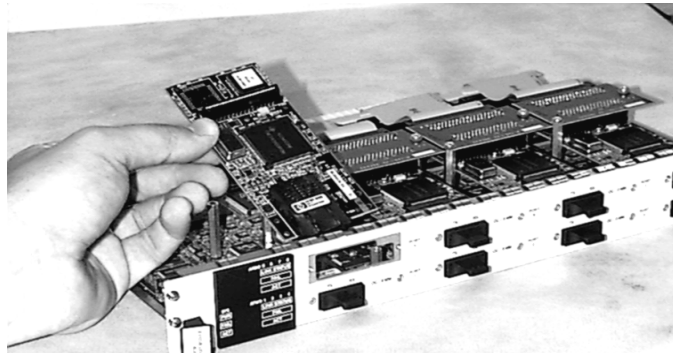
Remove the existing OC-3 pluggable modules from ports 5 and 6. The following instructions 2-5 show how to remove an OC-3 pluggable module from port 5. Repeat them for port 6.

- 2 Remove the screws attaching the OC-3 expansion board to the tall spacer posts and lift up the expansion board, as shown in Figure 3-10.



**Figure 3-10** Removing the OC-3 Expansion Board

- 3 While holding the expansion board with one hand, remove the attached flat cable from its connector on the 8-Port Board with the other hand. This completes the removal of the expansion board.
- 4 Unscrew the OC-3 Module from the short spacer posts, raise the rear section and remove it from the unit at an angle as shown in Figure 3-11.



**Figure 3-11** Removing the OC-3 Module

- 5 Remove the OC-3 Module label plates from the front panel.
- 6 Repeat steps 2-5 to remove an OC-3 Module from port 6 and then proceed to step 3 of section "Adding a 622 Module to Unoccupied Ports" on page 3-5.

---

## Connecting to Network Devices

Network devices are connected to the 622 Module optic port. For ATM cabling information, refer to the *CoreBuilder 7000 Installation & Setup Guide*.

System States

This section describes the different system states of the 622 Module and how they are indicated on the LED display. The system states are:

- Power-up
- Normal operation
- Hardware fault
- Software fault
- No power to unit

System States and LEDs

The system status LEDs display the system state in which the 8-Port Board is currently operating. Referring to Figure 3-12, these are the three LEDs located under the label “SYS” on the left side of the LED panel: PWR, FAIL, and ACT. See the 8-Port Board ATM Interface User Guide for more information about the correlation between the current system state and the LEDs display.

The two groups of LEDs on the right of the LED display panel are the ATM interface status LEDs (see “ATM Status Indicators” on page 3-12 for details).

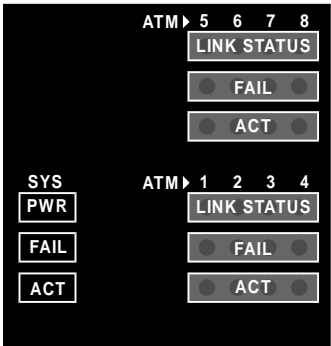


Figure 3-12 8-Port Board LED Display

Power-up

The 622 Module automatically runs diagnostic software at power-up. This software verifies that every component in the system is fully functional. In case of failure, a notification will appear on the LMA screen.

The 8-Port Board runs through its Power-on Self-Test, indicated by flashing system status LEDs. When the Power-on Self-Test terminates, the PWR LED stops flashing and remains on and the ACT LED continues flashing.

Diagnostics should take approximately 60 seconds or less. When the diagnostics are successfully completed, the FAIL LEDs on the modules turn off. In case the 622 Module fails, the corresponding ATM FAIL LED (LED 5 or 7) remains on. The PWR LED and LEDs of any active ports remain green. Table 3-1 presents the behavior of the ATM LED during the power-on sequence.

**Table 3-1** ATM LED Indications of Power-on Stages

Stage	ATM LED Indication	System event
1	Line of yellow, red, and green LEDs light continuously from left to right, then extinguish continuously from left to right	8-Port Board and 622 Module software downloaded
2	4 upper green ATM LEDs light while ATM ACT LED blinks 4 lower green LEDs light while ACT LED blinks	Download of respective pipe Receive/Transmit firmware into the 8-Port Board
3	Each row of ATM LEDs lights and extinguishes	Pipe memory initialization
4	ATM Link Green light remains lit	Connection

## Normal Operation

After completion of the Power-on Test, the 622 Module begins normal operation automatically. The SYS LEDs continue to display the system status of the 8-Port Board and the ATM LEDs display the status of the individual ATM data connections supported by the unit (see the 8-Port Board ATM Interface User Guide).

### ATM Status Indicators

The status of each ATM port is indicated by three LEDs, as follows (top to bottom): LINK STATUS, FAIL, and ACT (see Figure 3-12). A 622 Module installed in ports 5-6 is represented by the ATM LED of port 5; a 622 Module installed in ports 7-8 is represented by the ATM LED of port 7. LEDs 6 and 8 are always off. Table 3-2 provides a summary of the ATM status LEDs.

Table 3-2 ATM Status LEDs

LED	Modes	Meaning and User Action
LINK STATUS (green)	ON	ATM physical layer is connected and has no error
	OFF	ATM interface is not connected.
FAIL (red)	ON	ATM interface failure
	OFF	Normal operation
ACT (yellow)	Flashing	Data transfer over ATM port
	OFF	No traffic through port

**622 Module LEDs** In addition to the ATM Status LEDs discussed in the previous section, each 622 Module is equipped with a set of 6 LEDs which show its individual status. From left to right, the first three LEDs (0-2) show the status in the Tx direction; the last three (3-5) show the status in the Rx direction. The following table is organized by 622 Module LED.

Table 3-3 622 Module Status LEDs

LED	Modes	Meaning and User Action
0 (Green)	On	Initialization completed successfully
	Flashing	Rate of flashing according to Tx cell rate
1 (Red)	On	Initialization failed
2 (Orange)	Flashing	Timing loopback is active
3 (Green)	Flashing	Rate of flashing according to Rx cell rate
4 (Red)	On	Loss of carrier or loss of cell delineation
5 (Orange)	On	Yellow alarm (FEA)
	Flashing	Power-on test active

# 4

## CONFIGURATION AND FAST SETUP

This chapter describes the port configuration and network setup of the 622 Module in the host CoreBuilder 7000HD switch unit which allows it to begin functioning in the network almost immediately. The following topics are covered:

- Configuration of 622 Module ATM ports
- Network setup of the 622 Module via the Integrated Fast Setup of the host CoreBuilder 7000HD switch unit

---

### Configuring the 622 Module Interface

Once the 622 Modules are installed and operational in the 8-Port Board, you can configure them. The following items can be configured for each port:

- Enabling the interface
- Disabling the interface
- Re-initializing the interface
- Setting and saving the interface mode
- Setting and saving the clock operational mode

The ports are configured through the Local Management (LMA) console of the host CoreBuilder 7000HD. The configuration procedure is explained step by step in the following sections.



*The 622 Module is supported by CoreBuilder 7000HD s/w version 3.5 and up.*

For additional details on administration procedures for CoreBuilder 7000 elements, see *CoreBuilder 7000 Administration Guide*. The following menu information refers only to configuration of 622 Module interface cards.

## Accessing the Interface Card Menu

The 622 Module is configured by means of the Interface Card Menu of the CoreBuilder 7000HD Local Management software. After the Main Menu is accessed, its SYS submenu leads to the IFC Menu, where the five functions described in the previous section may be performed.

In the following example, the 622 Module is installed in the 8-Port Board in slot #3. Beginning with the CoreBuilder switch Main Menu, first verify that the software version is 3.5 or above. Select (8) VER as displayed in the following screen:

```
CB7000 switch module - Main Menu:
(1) SYS: Platform config ->
(2) LEM: Lan Emulation ->
(3) CON: Connections ->
(4) STS: Statistics ->
(5) DIA: Testing & Diagnostics ->
(6) FTR: ATM features
(7) LOG: Logout
(8) VER: Version
(9) FST: Fast Setup
[ '\ ' -Main,      '- ' -Back in menus]
[ '=0'-To switch, '=n'-To i/f card n (1-4)]

>8
```

The CoreBuilder version is displayed as follows. Verify that the “Switch Management version” number is at least 3.2.

```
CoreBuilder version:
Switch Management version:      3.5
Internal Communication version:  2.1
Interface Control Card 2 version: 3.1
4PB FPGA transmit version:      1.0
4PB FPGA receive version:       2.3
8PB FPGA transmit version:      1.2
8PB FPGA receive version:       1.2
OC12 PIGGY FPGA receive version: 3.50M
DATE\TIME
>
```

Press 'x' Enter to return to the Main Menu and then select (1) SYS. The Platform Configuration menu is displayed as follows:

```

CB7000 switch module - Platform config Menu:
(1) SET: Switch setup ->
(2) RES: Reset config to factory defaults
(3) LOA: Load system software ->
(4) SWM: Switch modules
(5) IFC: Interface cards ->
(6) PWS: Power supplies
(7) RBO: Reboot
[ '\ ' -Main,      '-' -Back in menus]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS>5

```

Now select (5) IFC. The Interface Card slot installation information is displayed followed by the Interface Card selection menu.

Slot id	Slot status	I/F card type	I/F card status
-----	-----	-----	-----
3	Occupied	8 port ATM I/F card	Up
4	Occupied	8 port ATM I/F card	Up
5	Free		Not exist
6	Free		Not exist

```

CB7000 switch module - Interface cards Menu:
(1) IF1: Interface card 1 ->
(2) IF2: Interface card 2 ->
(3) IF3: Interface card 3 ->
(4) IF4: Interface card 4 ->
[ '\ ' -Main,      '-' -Back in menus]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC>1

```

The display shows that slots 3 and 4 are occupied by 8-Port Boards.

In the Interface cards Menu select (5) IFC>1 to display the characteristics of the ports of the first interface card.



```
Interface card HW version is 5
```

If id	Physical type	Media type	Operational status	Admin status	Frame type	Clock mode
3.1	OC3-SC	(A)Multi mode fiber	Up	Enabled	SONET	Intern
3.2	OC3-SC	(A)Multi mode fiber	Up	Enabled	SONET	Intern
3.3	OC3-SC	(B)Multi mode fiber	Up	Enabled	SONET	Intern
3.4	OC3-SC	(B)Multi mode fiber	Up	Enabled	SONET	Intern
3.5	OC-12-SC	Multi mode fiber	Up	Enabled	SONET	Intern
3.6						
3.7	OC-12-SC	Single mode fiber short	Up	Enabled	SONET	Intern
3.8						

The parameters of the Interface Card appearing in the previous display are described in Table 4-1. The Interface Card parameter display is followed by the Interface Card Configuration menu for the selected Interface Card. It is discussed in the next section.

**Table 4-1** Interface Parameters

Parameter	Description
If id	Specifies the port ID number for each of the card's eight ports.
Physical Type	Specifies the port interface type (for example, OC3-SC, DS-3 BNC, 622-SC). The type determines the interface including the type of connector.
622/OC-3 Compatibility Type*	Indicates compatibility of this OC-3 Module with a 622 Module: "A" : Will not operate with a 622 module installed "B" : Will operate with a 622 module installed
Media Type	Specifies the type of fiber used by the port (for example, coaxial cable, single-mode fiber, multi-mode fiber).
Operational Status	The port may be "up" (enabled) or "down" (disabled), connected or not.
Admin Status	Can be either enabled or disabled.
Frame Type	Specifies the interface mode: can be either SDH or SONET for OC-3 and 622, and PDH for DS-3.
Clock Mode	This may be "internal" or "external". When "internal", the transmit (Tx) line uses an internal clock, and when "external" it uses the receive (Rx) line recovered clock.

\* If the OC-3 module is incompatible with the 622 (Type "A"), you can order a new version of the module which is compatible with the 622.

## The 8-Port Board Configuration Menu

The 8-Port Board configuration menu for the selected Interface Card is displayed as shown in the following screen. You can choose any of five options: Eif, Dif, INI, SPM and STM for any individual port. You will be prompted for the ID(s) of the ports whose settings you wish to change.

```
CB7000 switch module - Interface card 1 Menu:
  (1) Eif: Enable interface
  (2) Dif: Disable interface
  (3) INI: Reinit interface
  (4) SPM: Set & save interface mode
  (5) STM: Set & save clock operational mode
  (6) RSE: Read IFC technical information
[ '\ ' -Main,      '-' -Back in menus]
[ '=0'-To switch, '=n'-To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1>1
```

**Eif:** Enables port(s) - to enable or disable a OC3, DS3 or 622 port.

**Dif:** Disables port(s) - if you wish to shut down a OC3, DS3 or 622 port.

**INI:** Re-initializes port(s) - to reload a port's FPGA or reinit in cases of failure.

**SPM:** Allows setting and saving the port's interface mode as SDH (0) or SONET (1).

**STM:** Allows setting and saving the port's clock operational mode as internal (0) or external (1).

**Enabling an Interface** This is the first option in the Interface Card Menu and is invoked by typing in the character “1” following the prompt. The system then prompts for an interface ID and responds to this input with appropriate messages and reports.

```
(1)SYS\ (5)IFC\ (1)IF1>1
Enter parameter(s): 'Port number <slot.port>'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (1)Eif>>3.5
Port <3.5> is already enabled
```

**Disabling an Interface** This is the second option in the Interface Card Menu and is invoked by typing in the character “2” following the prompt. The system then prompts for an interface ID and responds to this input with appropriate messages and reports.

```
(1)SYS\ (5)IFC\ (1)IF1>2
Enter parameter(s): 'Port number <slot.port>'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (1)Dif>>3.5

Disable port completed successfully
```

### Re-initializing an Interface

This is the third option in the Interface Card Menu and is invoked by typing in the character "3" following the prompt. The system then prompts for an interface ID and responds to this input with appropriate messages and reports.

```
(1)SYS\ (5)IFC\ (1)IF1>3
Enter parameter(s): 'Port number <slot.port>'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (1)Dif>>3.5

Reinit port completed successfully
```

### Setting and Saving Interface Mode

This is the fourth option in the Interface Card Menu and is invoked by typing in the character "4" following the prompt. The system then prompts for interface ID(s) and responds to this input with appropriate messages and reports.

```
(1)SYS\ (5)IFC\ (1)IF1>4
Enter parameter(s): 'Port number(0.0 - For all)',
                  'Mode(0- SDH, 1- SONET)'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (4)SPM>>3.5

Parameters: 'Port number(0.0 - For all)' - '3.5'

Enter parameter(s): 'Mode(0- SDH, 1- SONET)'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (4)SPM>>1

Setting interface mode for port <3.5> completed successfully
```

**Setting and Saving  
Clock Operational  
Mode**

This is the fifth option in the Interface Card Menu and is invoked by typing in the character “5” following the prompt. The system then prompts for interface ID(s) and responds to this input with appropriate messages and reports.

```
(1)SYS\ (5)IFC\ (1)IF1>5
Enter parameter(s): 'Port number(0.0 - For all)',
                  'Mode(0- Internal, 1- External)'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (5)STM>>3.5
Parameters: 'Port number(0.0 - For all)' - '3.5'

Enter parameter(s): 'Mode(0- Internal, 1- External)'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (4)SPM>>0

Setting clock operational mode for port <3.5> completed successfully
```

**CoreBuilder 7000  
Integrated Fast  
Setup**

The CoreBuilder 7000HD Switch local management software features an Integrated Fast Setup procedure which configures both the Switch and all Interface Cards installed in it in one continuous dialog. This procedure lets you make the logical connections that enable the 622 Module to function as part of the network.

In this section, only that part of the Integrated Fast Setup that is relevant to setting up the 622 Module will be shown. For additional information about Integrated Fast Setup please refer to the CoreBuilder 7000HD switch unit documentation and to the 8-Port Board ATM Interface documentation.

**Setup Procedure  
Sections**

The Integrated Fast Setup consists of the following steps or sections. Relevancy of the section to the 622 Module is indicated.

**Table 4-2** Integrated Fast Setup Procedure Sections

Setup Section	Relevant to 622 Module
Network Prefix	No
LE Parameters	No
LECS Address	No
UNI/NNI parameters	Yes
LE Client Configuration	No
Virtual Network Configuration	No
Admin VN Management Configuration	No
Confirmation	Yes

**Example Dialog** The following dialog appears on the screen:

```
Now reading the modules configuration, please wait ...

Special module configuration will be overridden by fast setup.
continue full fast setup or only switch fast setup (S<witch>, F<ull>): F

***Note: Full fast setup, special module configuration will be overridden.

Fast Setup Utility
=====

The flash configuration will be displayed below;
Update if needed, and then hit Enter.

To move between sections, enter the following characters at end of line:
< > - Back and forth in sections      >S - Jump to section ID S
\   - Back to beginning of setup      $ - To end of setup

Only in Virtual Network Configuration section (group=slot; item=port):
}G - Jump to group #G                  +I - Jump to item #I
* - Update all group items              ** - Update all section items
```

### UNI/NNI Parameters Section

The UNI/NNI parameter refers to the role or *profile* that a port of the CoreBuilder 7000 assumes in the network interface between it and the ATM device attached to that port. There are three possibilities: UNI, NNI, and GWY.

- UNI - the port is connected to another CoreBuilder 7000 and assumes a user profile. The other CoreBuilder 7000 assumes a network profile.
- NNI - the port is connected to an ATM end user or to another CoreBuilder 7000 and assumes a network profile. The other device assumes a user profile.
- GWY - the port is connected to an ATM device of another vendor and assumes a gateway profile.

The following screen illustrates the assignment of the UNI/NNI parameters to each port. This is the only section directly relevant to the 622 Module.

- Slot #3 contains an 8-Port Board with one 622 Module installed; it appears on port <3.5>.
- Slot #4 contains an 8-Port Board with two 622 Modules installed; they appear on ports <4.5> and <4.7>.
- Slots #5 and #6 contain 8-Port Boards without any 622 Modules installed.

```
UNI/NNI parameters
=====
NNI max hops (0 - 120): 7
NNI type of port <3.1> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <3.2> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <3.3> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <3.4> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <3.5> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <3.7> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <3.8> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <4.1> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <4.2> (U<NI>, N<NI>, G<ateway>): G
NNI type of port <4.3> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <4.4> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <4.5> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <4.7> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <5.1> (U<NI>, N<NI>, G<ateway>): G
NNI type of port <5.2> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <5.3> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <5.4> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <5.5> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <5.6> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <5.7> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <5.8> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <6.1> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <6.2> (U<NI>, N<NI>, G<ateway>): G
NNI type of port <6.3> (U<NI>, N<NI>, G<ateway>): G
NNI type of port <6.4> (U<NI>, N<NI>, G<ateway>): G
NNI type of port <6.5> (U<NI>, N<NI>, G<ateway>): G
NNI type of port <6.6> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <6.7> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <6.8> (U<NI>, N<NI>, G<ateway>): U
```



## Confirmation Dialog Section

The final confirmation dialog appears as follows:

```
Accept Changes
=====
*** Note: Change of some parameters will take effect now!!

Save changes (Y/N)? Y
Are you sure (Y/N)? y
Saving NMS parameters...
Saving LE parameters...
Saving Network Prefix...
Saving resident LECS Address...
Saving active LECS Address...
Saving NNI parameters...
The switch new configuration has been saved.

Now applying the module in slot #4 ...

Due to new VN configuration, some saved static
entries in slot #4 have been invalidated.

The new VN configuration in slot #4 has been applied and saved.

Now applying the module in slot #5 ...

Due to new VN configuration, some saved static
entries in slot #5 have been invalidated.

The new VN configuration in slot #5 has been applied and saved.

All the modules new configuration has been applied.
```



# ATM-LAYER PROCESSING

This chapter describes the operation of the ATM-layer processing in a 622 Module installed in a CoreBuilder 7000HD switch 8-Port Board. The following topics are discussed:

- Multiplexing ATM Data Streams
- ATM-Layer Conversion
- Traffic Management Basics
- Traffic Management in the 622 Module

---

## Multiplexing ATM Data Streams

The CoreBuilder 7000HD high-density switch unit processes ATM data at a rate of 310 Mbps - twice the highest ATM line rate of 155 Mbps. The 8-Port Board was specially designed to provide an interface between the line data flow and the CoreBuilder 7000HD unit. It can accept data from the line, either through the OC-3 interface at 155 Mbps, or through the 622 Module interface at up to 622 Mbps, and transmit it to the CoreBuilder 7000HD unit in two channels of 310 Mbps.

## Multiplexing Input Data from OC-3 Ports

This task is performed by the ATM-layer processor unit in the 8-Port Board. It accepts ATM input data from each vertically-aligned *pair* of OC-3 ports of the 8-Port Board and then multiplexes the data into one special data channel called a *pipe*. A pipe, therefore, carries an amount of ATM data equivalent to that carried by two OC3 physical ports, that is, 310 Mbps.

The pipe brings the multiplexed ATM data to the SRE\_L Matrix of the CoreBuilder 7000HD for further processing. The SRE\_L Matrix is able to accept ATM data from 16 pipes simultaneously. Since each pipe corresponds to two OC3 physical ports, as explained above, the SRE\_L Matrix can handle the input from four 8-Port Boards simultaneously

(32 ports), that is, when the CoreBuilder 7000HD is fully populated by 8-Port Boards.

### **De-multiplexing Input Data from 622 Ports**

When ports 5-6 or ports 7-8 on the upper tier are occupied by a 622 Module the flow is similar. The data entering the 622 Module is split into two channels of 155 Mbps capacity each.

The ATM-layer processor multiplexes each one of the channels from the 622 Module with the data from one of the fixed on-board OC-3 ports directly below the 622 Module on the lower tier into a pipe. Thus the data from the 622 Module together with the data from both OC-3 ports directly below is carried into two pipes. Refer to Figure 5-1.

*622 Mbps  
throughput*

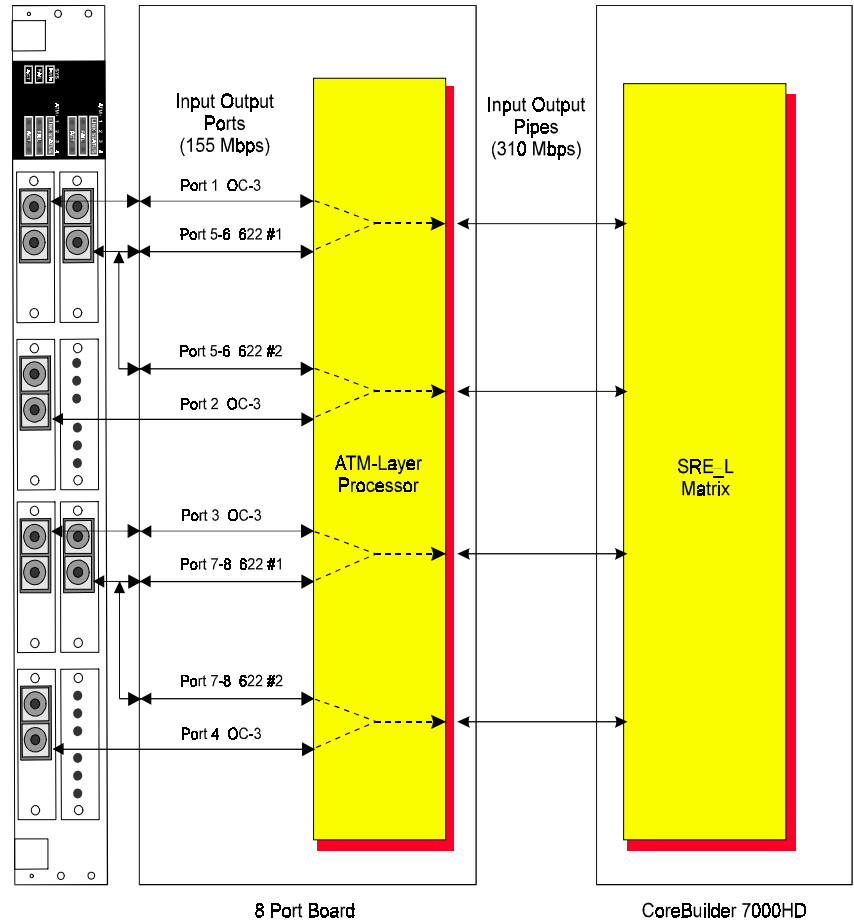
*Note that with this arrangement the 622 Module is able to utilize any unused bandwidth made available when either of the OC-3 interfaces is not operating at full rate; thus when the OC-3 interfaces are not active, the bandwidth through the 622 Module can achieve 310 Mbps on each pipe for a total of 622 Mbps.*

### **Multiplexing Output Data on the 622 Port**

Output ATM data is handled in the reverse sequence: ATM data coming in on a pipe from the CoreBuilder 7000HD switch board to the 8-Port Board is de-multiplexed by the ATM-layer processor into two output channels and routed to a vertically-aligned pair of OC-3 ports of the 8-Port Board or, in case a 622 Module is installed, to one channel of the 622 Module and one channel of the OC-3 port directly below it.

The two output channels entering the 622 Module are multiplexed into one channel to be delivered to the line.

Figure 5-1 shows how the ATM-layer processor combines the data streams between the physical ports of the 8-Port Board (shown vertically on the left) and the SRE\_L Matrix of the CoreBuilder 7000HD. In the figure, ports 5-6 are shown occupied by a 622 Module and ports 7 and 8 by OC-3 interfaces.



**Figure 5-1** Multiplexing between ports and pipes

## ATM-Layer Conversion

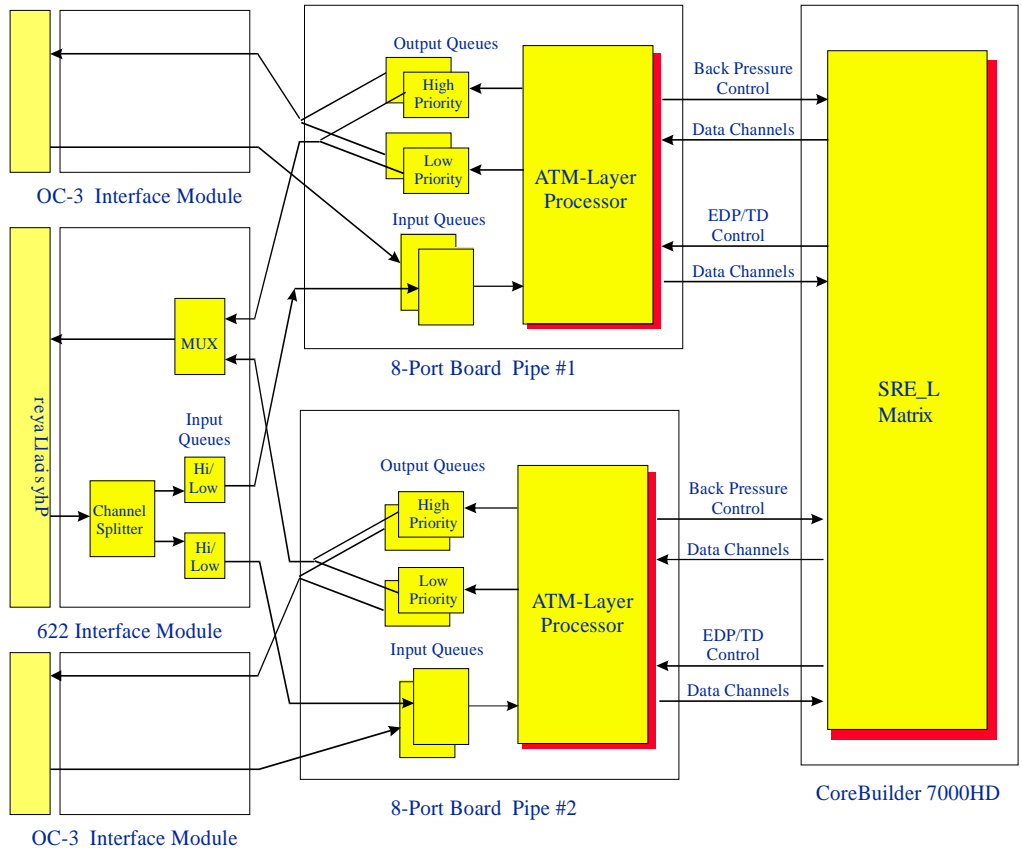
Another task of the ATM-layer processor is to encode and decode ATM-layer data into an internal format which is used by the CoreBuilder switch unit. It also performs the following specific tasks:

- Header Manipulation
- VPI/VCI Range Support & Per VC Statistics

### Header Manipulation

The ATM layer processor allows full header processing - VPI, VCI, CLP, PTI, and GFC fields on both the input and output. The processing allows setting and clearing specific bits within the header.

<b>VPI/VCI Range Support &amp; Per VC Statistics</b>	VPI and VCI are allocated according to mode. For VP switching and tunnelling, more VPI bits are allocated, and for end user connectivity more VCI bits are allocated. The total per port is 4096 VPCI. In addition, the 8-Port Board is able to maintain per VC statistics.
<b>Traffic Management Basics</b>	ATM technology is intended to support a wide variety of services and applications. Each type of application, whether it be voice, video or data, has its own special data transmission performance requirements. These requirements are expressed in a set of parameters called <i>Quality of Service</i> (QoS) which includes such factors as permissible transmission delay and loss of information. An important task of the ATM network is to be able to provide the appropriate QoS requirements for each application it is carrying. Traffic Management is provided on the ATM network to protect the network and the end-system from congestion in order to achieve network performance objectives. An additional role is to promote the efficient use of network resources. TM allows the devices to transmit over a broader bandwidth for longer periods of time, making the network more efficient.
<b>Closed-loop Control Methods</b>	Different methods are used to support Traffic Management. Many of them work on a closed-loop feedback control principle where congestion is sensed at some point in the network and a control signal is sent back in order to limit the traffic at its source.
<b>Traffic Management Hardware</b>	The hardware units responsible for traffic management are the 622 Module processing unit, the ATM-Layer processor in the 8-Port Board and the SRE_L Matrix in the CoreBuilder switch unit. The traffic management control flow between these is shown in Figure 5-2.



**Figure 5-2** Traffic Management Control Flow

### Traffic Management in the 8-Port Board

One of the most powerful features of the 8-Port Board is its ability to work with the CoreBuilder 7000HD switch unit to handle traffic congestion and minimize loss of high priority data. The 8-Port Board provides several key closed-loop feedback mechanisms to achieve this end:

- Priority Output Buffers
- Back Pressure Cell Storage
- Early Packet Drop (EPD)
- Tail Drop (TD)

These methods are discussed in detail in the 8-Port Board ATM Interface User Guide.

---

## Traffic Management in the 622 Module

As mentioned (see “De-multiplexing Input Data from 622 Ports” on page 5-2), when the 622 module is installed on the upper tier of the 8-Port Board, its data flow is combined with the data flow of the two on-board 155 Mbps OC3 ATM interfaces directly below it on the lower tier, giving a combined *input* data capacity of 930 Mbps for the three ports.

The data *throughput* for the three ports, however, is limited to 620 Mbps. The reason is that the combined data from the three ports feeds into the two pipes associated with these ports and these two pipes have a combined data flow capacity of 620 Mbps.

### 622 Module Data Flow Priority

Throughput for the 622 Module data is increased by giving it priority over the incoming data on the OC-3 Port below it. When the two ports are combined into a pipe (one from the 622 Module and one from the OC-3 port) the bandwidth of the 622 Module channel is augmented at the expense of the bandwidth of the OC-3 channel.

This process of shifting bandwidth between channels is controlled by the Call Control and CAC software in such a way that the QoS parameters associated with each call remain within the allowed limits.

### Handling Burst Transmissions

Due to the limitation in throughput, the 622 Module in an 8-Port Board cannot handle a continuous input at 622 Mbps. In order to prevent such a situation from occurring, the host CoreBuilder notifies the other switches connected to it that it is *bandwidth-limited*. Then, any switch that has the capability of transmitting at 622 Mbps will limit itself to transmitting at that rate only for short durations, that is, burst transmissions.

Burst data can be handled by the 622 Module; these are the mechanisms which enable it to do so.

- Priority Input Buffers
- Tail Drop in the 622 Module

### Priority Input Buffers

One primary way in which the 622 Module controls input data loss is by prioritizing the input data. A data frame for which certain losses or delays in transmission could be tolerated according to its QoS is designated as lower priority data; other more sensitive data would be

designated as high priority data. For example, voice data is sensitive to loss and jitter, and is therefore classified as high-priority data. The 622 Module processor assigns priorities to cells according to a frame priority decision made by software.

Loss of high priority data is minimized by maintaining two input buffers, corresponding to high and low priority. The 622 Module processor routes the high-priority and low-priority input data to their respective buffers.

The data in the high-priority buffer is always transmitted before the data in the low priority buffer so that, in case of congestion, it is the low priority buffer which will overflow first.

The size of the input buffers are:

- High priority - 300 cells per VC, for a total of 600 cells
- Low priority - 1200 cells per VC, for a total of 2400 cells

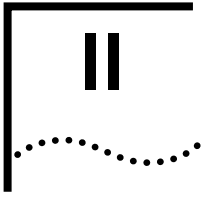
## **622 Module Tail Drop**

Tail Drop (TD) in the 622 Module serves the purpose of reducing traffic congestion by dropping incoming data frames. It is employed when congestion has already reached the state that the input buffers are overflowing, cells are being lost and the frame is corrupted. This method is known as Tail Drop (TD) since the “tail” or remainder of the corrupted frame is dropped.

This method works as follows: Cell-loss in an incoming data frame is sensed by the Rx FPGA unit of the 622 Module which then removes the rest of the frame. This way the input buffers are cleared of corrupted frames, making room for the others. Different buffer level thresholds are enabled for TD according to the different QoS required.

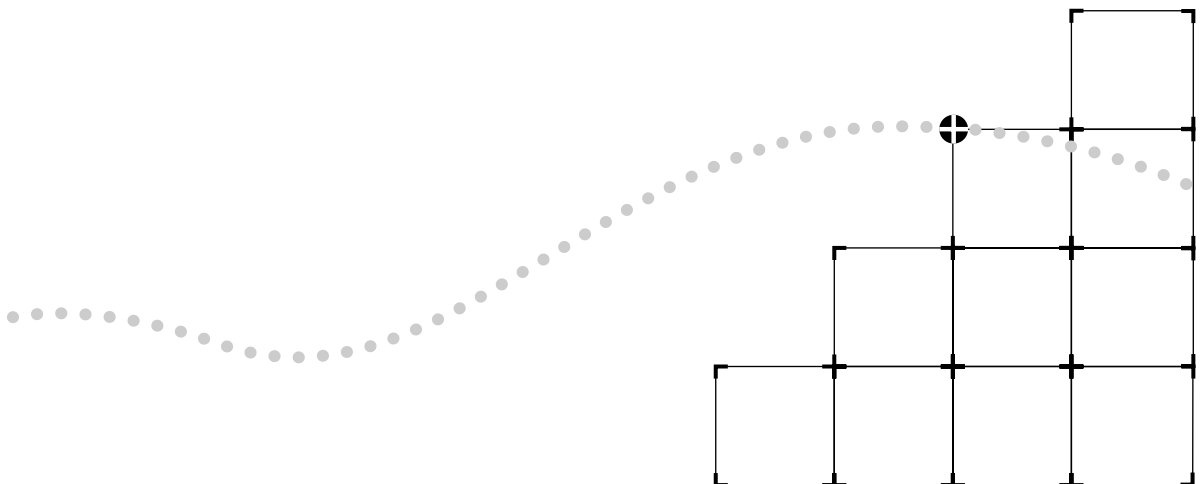
The Tail Drop feature can be activated selectively per VPI/VCI channel or, alternatively, for all channels of the 622 Module.





# 622 MBPS ATM INTERFACE IN AN ATM I/F CARRIER

- Chapter 6 Overview
- Chapter 7 Installation and Power-up
- Chapter 8 Configuration and Fast Setup
- Chapter 9 ATM-Layer Processing



# 6

## OVERVIEW

This chapter contains an overview of the major characteristics and capabilities of the 622 Mbps ATM Interface Module when installed in an ATM Interface Carrier Module (referred to below as the 622 Module and the ATM I/F Carrier respectively). The topics covered in this chapter include:

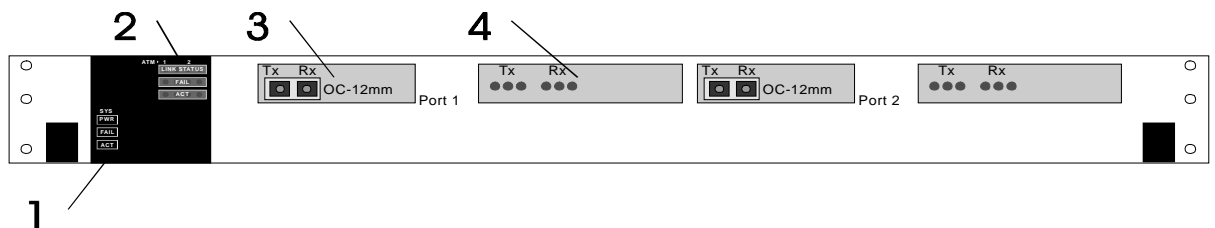
- Overall description of the unit
- Capabilities and technological highlights

### About the 622 Module

The 622 Module is an interface module for the CoreBuilder 7000HD switch units which is installed as a pluggable module in the ATM I/F Carrier Module of the CoreBuilder switch. Two 622 Modules can be installed on each ATM I/F Carrier.

### Front Panel Layout

The front panel of the ATM I/F Carrier with two 622 Modules installed is shown in Figure 6-1.



**Figure 6-1** ATM I/F Carrier Front Panel with Two 622 Modules Installed

Each 622 Module has two components: an ATM optical interface (3) on the left side and 622 LED indicators (4) on the right side. For an explanation of the functionality of the 622 LEDs see "622 Module LEDs" on page 7-12.

The LED indicators on the left side of the front panel show the module's operational status, including system status LEDs (1) and ATM LEDs (2) (see "System States" on page 7-9 for details).

---

## **622 Module/Carrier Capabilities**

The 622 Module/ATM I/F Carrier provides the following capabilities:

- Multiple high speed ATM connectivity
- Increased data flow capacity
- Traffic management to prevent loss of high priority data

### **Data Flow Capacity**

The throughput of each 622 Module is 620 Mbps. The ATM processing unit of the ATM I/F Carrier splits the data from each 622 Module into two ATM data channels called pipes which carries the data into the CoreBuilder 7000HD. The ATM I/F Carrier has four pipes, each of which can handle 310 Mbps making a total throughput of 1.25 Gbps for the entire 622 Module/Carrier.

### **Burst Transmissions**

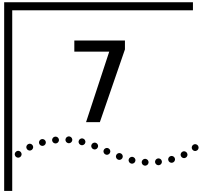
The 622 Module in a ATM I/F Carrier can handle burst transmissions at the full 622 Mbps rate using special traffic management mechanisms (see "Handling Burst Transmissions" on page 9-8).

### **Traffic Management**

The 622 Module, in coordination with the ATM I/F Carrier, features several different methods of preventing loss of high priority data including:

- Priority Input Buffers (on the 622 Module)
- Tail Drop (TD) (on the 622 Module)
- Priority Output Buffers (on the ATM I/F Carrier)
- Back Pressure Cell Storage (on the ATM I/F Carrier)
- Early Packet Drop (EPD) (on the ATM I/F Carrier)

For further information, see "Traffic Management in the ATM I/F Carrier" on page 9-5.



# INSTALLATION AND POWER-UP

This chapter contains a description of the installation and system states of the 622 Module in an ATM I/F Carrier. The topics covered in this chapter include:

- Safety precautions
- Installation of the 622 Module into an ATM I/F Carrier Card of the CoreBuilder 7000HD switch unit
- Installation of the ATM I/F Carrier Card in a CoreBuilder 7000HD ATM switch
- Connecting to network devices
- 622 System States and LED indicators
- Power-up procedure

---

## Safety Precautions



*Read the following safety precautions carefully to reduce the risk of electric shock and fire.*

*When handling replacement parts, 3Com recommends that you always use a wrist strap connected to a proper ground. This helps prevent the module from being damaged by electrostatic discharge. Additionally, when not in use, the module should be stored in an antistatic bag.*

*If the system is powered on when you are replacing a module, do not insert any metal objects, such as a screwdriver or a finger with jewelry, in the open slot. This could cause burns or other bodily harm, as well as system damage.*

- All servicing should be undertaken ONLY by qualified service personnel.
- DO NOT operate the unit in a location where the maximum ambient temperature exceeds 40 degrees C.
- Ensure that the chassis ventilation openings in the unit are NOT BLOCKED.
- DO NOT plug in, turn on or attempt to operate an obviously damaged unit.

---

## Mesures de sécurité



*Lire attentivement les mesures de sécurité afin de réduire les risques d'électrocution et d'incendie.»*

*Lors de la manipulation des pièces de rechange, 3 Com recommande de toujours utiliser une bande attachée au poignet et reliée à la terre. Cela aidera à éviter que la pièce ne soit endommagée par une décharge électrostatique. De plus, lorsqu'il n'est pas utilisé, le module doit être conservé dans un emballage antistatique.*

*Si le système est alimenté lors de l'installation ou du remplacement d'un module, ne jamais insérer d'objet métallique tel qu'un tourne-vis ou un doigt portant un bijou dans la fente. Cela est susceptible de provoquer brûlures ou autres dommages corporels, et d'endommager le système.*

- Le service après-vente ne devra être effectué que par un personnel qualifié.
- Ne pas faire fonctionner l'unité dans un endroit où la température ambiante maximale dépasse 40 degrés C.
- S'assurer que les orifices de la ventilation du châssis de l'unité ne sont pas obstrués.
- Ne jamais essayer de brancher, allumer ou faire fonctionner une unité apparemment endommagée.

---

## Vorsichtsmaßnahmen



*Lesen Sie die folgenden Vorsichtsmaßnahmen sorgfältig, um das Risiko von Stromschlag oder Brandgefahr zu vermeiden.*

*Wenn Sie Ersatzteile handhaben, benutzen Sie immer ein Band am Handgelenk, daß gut geerdet ist. Das hilft vermeiden, daß das Ersatzteil durch elektrostatische Entladung beschädigt wird. Darüber hinaus sollte ein Modul, wenn nicht benutzt, in einem antistatischen Beutel aufbewahrt werden.*

*Steht das System unter Strom, wenn sie ein Modul installieren oder auswechseln, führen Sie keine Metallgegenstände, wie einen Schraubenzieher oder einen Finger mit Schmuck in den offenen Schlitz ein. Das könnte zu Verbrennungen oder anderen Körperschäden führen, sowie auch zu Schäden am System.*

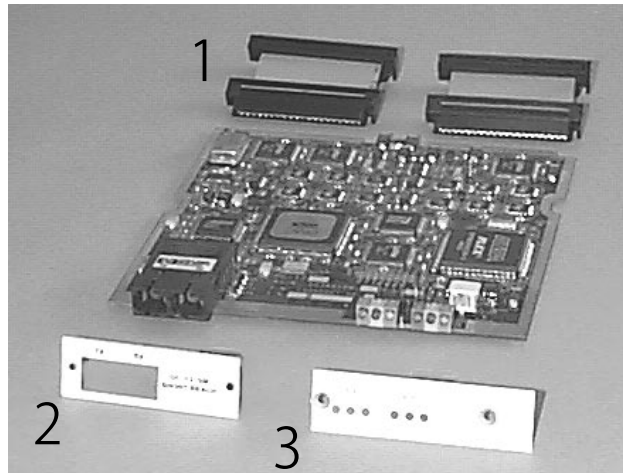
- Jede Wartung sollte NUR von befugtem Wartungspersonal durchgeführt werden.
- Nehmen Sie das Gerät NICHT in Betrieb, falls die Temperatur der Umgebung 40 Grad C übersteigt.
- Gehen Sie sicher, daß die Lüftungsöffnungen am Gehäuse NICHT BLOCKIERT sind.
- Eine offensichtlich schadhafte Einheit sollte weder angeschlossen, eingeschaltet noch in Betrieb genommen werden.

## Installing the 622 Module

This section describes how to install the 622 Module into the ATM I/F Carrier.

### Interface Kit

The pluggable module interface kit, shown in Figure 7-1, contains the additional components required to install the 622 Module into the ATM I/F Carrier of the CoreBuilder.



**Figure 7-1** Installation Kit Components

It consists of the following components:

- Two Flat cables (see 1)
- Interface label plate for optic port (see 2)
- Interface label plate for 622 Module LEDs (see 3)



*The 622 Module will not operate in a CoreBuilder 7000 unit in which either a 4-Port Board Unit or a 7200 Interface Card is installed.*

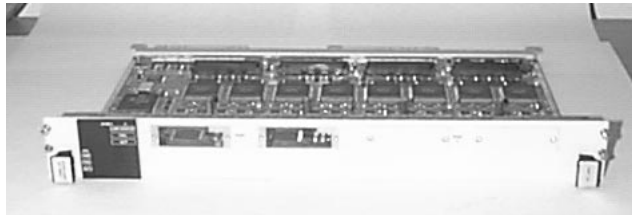
**Installation  
Procedure**

To install the the pluggable 622 Module into ATM I/F Carrier of the CoreBuilder 7000HD Switch unit, perform the following procedure:

- 1 Place the ATM I/F Carrier on an anti-static horizontal work surface, component-side up as in Figure 7-2. The ATM I/F Carrier is shipped with the two cutouts for port 1 uncovered and the two cutouts for port 2 covered .

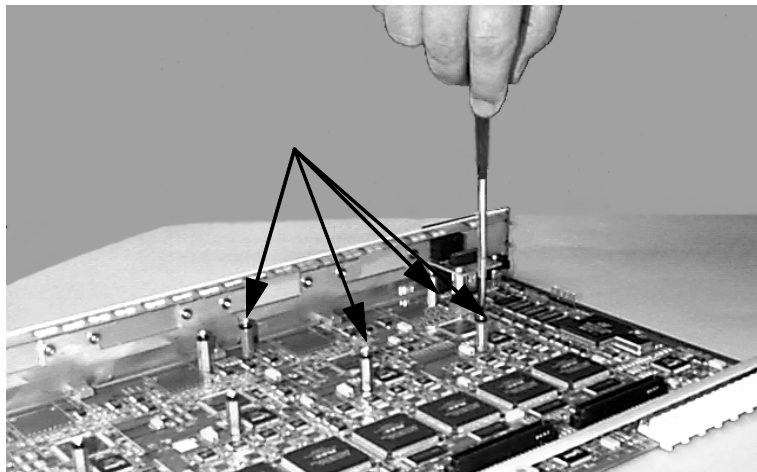


*The 622 Module can be installed in either port 1 or in port 2. In this section the 622 Module is installed in port 1. The procedure is identical for installation in port 2 except that the port 2 cover plates need to be removed.*



**Figure 7-2** ATM I/F Carrier Ready for Installing a 622 Module

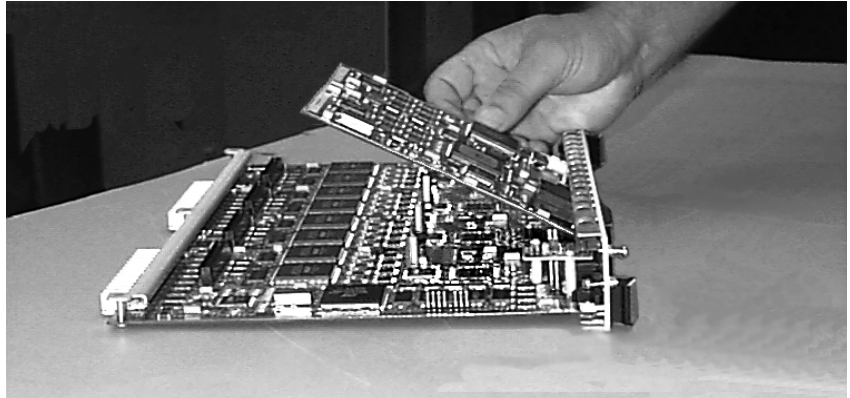
- 2 On the board you will see a number of spacer posts provided to hold the 622 Modules. Directly behind each pair of cutouts there are four spacer posts. The arrows in Figure 7-3 show the four spacer posts behind the two port 1 cutouts.



**Figure 7-3** Removing Screws from Spacer Posts



- 3 Again referring to Figure 7-3 unscrew the screws from the four spacer posts.
- 4 Holding the 622 Module behind the front panel at an angle as shown in Figure 7-4, carefully insert the optic port into the left port 1 cutout and the LEDs into the right port 1 cutout and lower the 622 Module so that it rests on the four spacer posts.

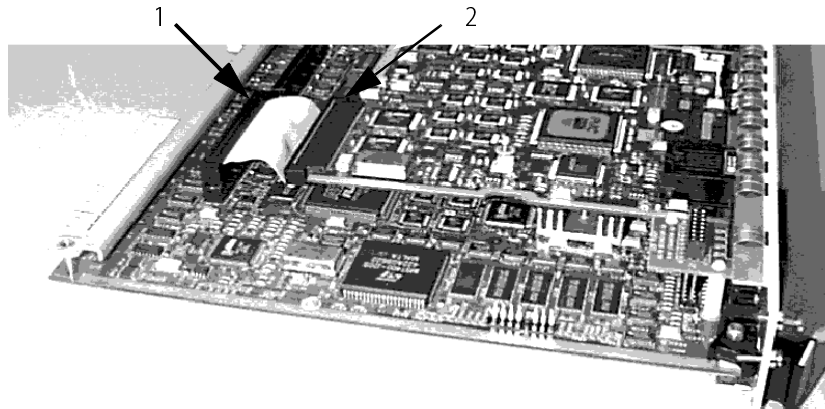


**Figure 7-4** Inserting the 622 Module

- 5 Position the 622 Module on the spacer posts and screw it in place using a flat washer followed by a spring washer.
- 6 Connect the two flat cables as shown in Figure 7-5. First plug one end of the cable into the cable connector (1) on the ATM I/F Carrier board. Then plug the other end of the cable into the edge connector (2) on the rear of the 622 Module. Repeat for the second cable.



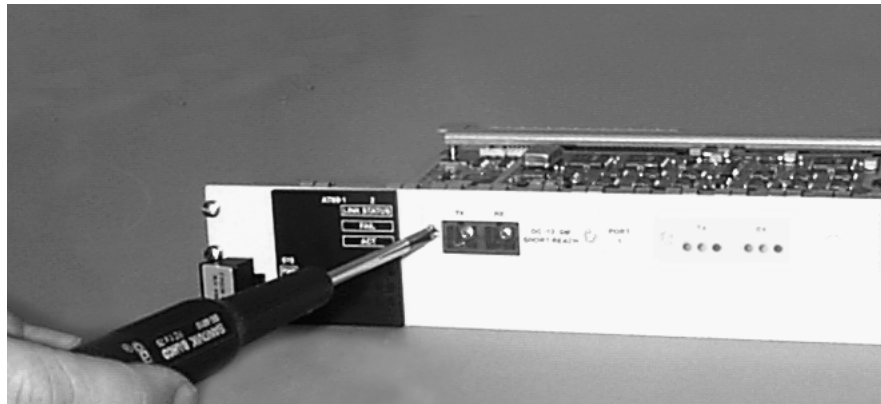
*Note that it is physically possible to plug either end of the flat cable into the cable connector on the ATM I/F Carrier Board. You will know that you have plugged in the correct end if the cable extends forward from the connector in the direction of the 622 Module, as shown in Figure 7-5. In addition, the red line should be on the right side of the cable when viewed from the front of the ATM I/F Carrier Board.*



**Figure 7-5** Connecting Flat Cables

- 7 Screw the optic port plate on the left port 1 cutout and the LED plate on the right port 1 cutout as shown in Figure 7-6. Align the 622 LEDs with the holes in the LED plate, loosening and tightening the 622 Module screws if necessary.

The installation is now completed.



**Figure 7-6** 622 Module Installed in a ATM I/F Carrier Board

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## Installing the ATM I/F Carrier

This section describes how to install the ATM I/F Carrier in a CoreBuilder 7000 or 7000HD ATM switch. For more information about installing the CoreBuilder 7000, refer to *CoreBuilder 7000 Installation & Setup Guide*.

To insert the ATM I/F Carrier in the CoreBuilder 7000HD ATM switch:

- 1 Orient the ATM I/F Carrier so its labelling is upright and make sure the locking handles are in the outward position.
- 2 Insert the module into the chassis by placing it between the guides of the selected slot and sliding the module until it stops.
- 3 Make sure the module sits in the guide slots on either side. Be sure that the loose screws do not interfere with module insertion.
- 4 Grab both locking handles and push them inward. This locks the module into the chassis. You may have to apply considerable pressure to the handles. An audible “click” indicates that the connectors have engaged.
- 5 Tighten the module’s securing screws. You are now ready to connect cables to the appropriate ports of the module.

To extract the ATM I/F Carrier from the CoreBuilder 7000 chassis, perform steps 1-5 in reverse order.

---

## Connecting to Network Devices

The ports are numbered from 1 to 2, left to right, on the mounting plate of the front panel. For ATM cabling information, refer to the *CoreBuilder 7000 Installation & Setup Guide*.

## System States

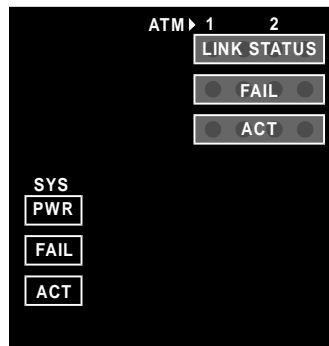
This section describes the different system states of the ATM I/F Carrier and how they are indicated on the LED display. The system states are:

- Power-up
- Normal operation
- Hardware fault
- Software fault
- No power to unit

### System States and LEDs

The system state in which the ATM I/F Carrier Module is currently operating is displayed by the system status LEDs. Referring to Figure 7-7, these are the three LEDs located under the label “SYS” on the left side of the LED panel: PWR, FAIL, and ACT. Table 7-1 shows the correlation between the current system state and SYS LEDs display. For example, during normal operation the PWR LED is on, the FAIL LED is off and the ACT LED is flashing.

The two groups of LEDs on the right of the LED panel are the ATM interface status LEDs (see “ATM Status Indicators” on page 7-11).



**Figure 7-7** ATM I/F Carrier LED Display

**Table 7-1** ATM I/F Carrier System States

System State	Power (green):	Fail (red)	Active (orange):
Power-up	See Table 7-3	See Table 7-3	See Table 7-3
Normal operation	On	Off	Flashing
Hardware fault	On	On	Off
Software fault	On	Off	Not flashing
No power to unit	Off	Off	Off

The following table also provides information about the LED display of system states but is organized by system status LED.

**Table 7-2** System Status LEDs

LED	Modes	Meaning and User Action
PWR (green)	ON	Power is applied.
	OFF	No power.
FAIL (red)	ON	A hardware fault in the unit has been detected. If possible, extract the ATM I/F Carrier from the chassis and plug it back in. If this fails to rectify the problem, contact your supplier.
	OFF	No hardware fault detected.
ACT (orange)	Flashing	Normal operation.
	Not flashing	A software problem has been detected. If possible, extract the ATM I/F Carrier from the CP7000 chassis and plug it back in. If this fails to rectify the problem, contact your supplier.

## Power-up

The 622 Module automatically runs diagnostic software at power-up. This software verifies that every component in the system is fully functional. In case of failure, a notification will appear on the LMA screen.

The ATM I/F Carrier will run through its Power-on Self-Test, indicated by flashing system status LEDs. When the Power-on Self-Test terminates, the PWR LED remains on continuously and the ACT LED is flashing.

Diagnostics should take approximately 60 seconds or less. When the diagnostics are successfully completed, the FAIL LEDs on the modules turn off. In case the 622 Module fails, the corresponding ATM FAIL LED (LED 1 or 2) remains on. The PWR LED and LEDs of any active ports remain green. The Table 7-3 presents the ATM LED behavior during the power-on sequence.

**Table 7-3** ATM LED Indications of Power-on Stages

Stage	ATM LED Indication	System event
1	Line of yellow, red, and green LEDs light continuously from left to right, then extinguish continuously from left to right.	ATM I/F Carrier and 622 Module software downloaded
2	4 upper green ATM LEDs light while ATM ACT LED blinks 4 lower green LEDs light while ACT LED blinks	Download of respective pipe Receive/Transmit firmware into the ATM I/F Carrier
3	Each row of ATM LEDs lights and extinguishes	Pipe memory initialization
4	ATM Link Green light remains lit	Connection

Normal Operation	After completion of the Power-on Test, the ATM I/F Carrier begins normal operation automatically. The SYS LEDs continue to display the system status of the ATM I/F Carrier and the ATM LEDs display the status of the individual ATM data connections supported by the unit.
ATM Status Indicators	The status of each ATM port is indicated by three LEDs, as follows (top to bottom): LINK STATUS, FAIL, and ACT (see Figure 7-7). Table 7-4 provides a summary of the ATM status LEDs.

**Table 7-4** ATM Status LEDs

LED	Modes	Meaning and User Action
LINK STATUS (green)	ON	ATM physical layer is connected and has no error.
	OFF	ATM interface is not connected.
FAIL (red)	ON	ATM interface failure. This LED should never be ON.
	OFF	Normal operation.
ACT (yellow)	Flashing	Data transfer over ATM port.
	OFF	No traffic through port.

**622 Module LEDs**

In addition to the ATM Status LEDs discussed in the previous section, each 622 Module is equipped with a set of 6 LEDs which show its individual status. From left to right, the first three LEDs (0-2) show the status in the Tx direction; the last three (3-5) show the status in the Rx direction. The following table is organized by 622 Module LED.

**Table 7-5** 622 Module Status LEDs

LED	Modes	Meaning and User Action
0 (Green)	On	Initialization completed successfully
	Flashing	Rate of flashing according to Tx cell rate
1 (Red)	On	Initialization failed
2 (Orange)	Flashing	Timing loopback is active
3 (Green)	Flashing	Rate of flashing according to Rx cell rate
4 (Red)	On	Loss of carrier or loss of cell deliniation
5 (Orange)	On	Yellow alarm (FEA).
	Flashing	Power-on test active

# 8

## CONFIGURATION AND FAST SETUP

This chapter describes the port configuration and network setup of the 622 Module in the host CoreBuilder 7000HD switch unit which allows it to begin functioning in the network almost immediately. The following topics are covered:

- Configuration of 622 Module ATM ports
- Network setup of the 622 Module via the Integrated Fast Setup of the host CoreBuilder 7000HD switch unit

---

### Configuring the 622 Module Interface

Once the 622 Module is installed and operational, you can configure each port individually. The following items can be configured for each port:

- Enabling the interface
- Disabling the interface
- Re-initializing the interface
- Setting and saving the interface mode
- Setting and saving the clock operational mode

The ports are configured through the Local Management (LMA) console of the host CoreBuilder 7000HD. The configuration procedure is explained step-by-step in the following sections.



*The 622 Module is supported by CoreBuilder 7000HD s/w version 3.5 and up.*

For additional details on administration procedures for CoreBuilder 7000 elements, see *CoreBuilder 7000 Administration Guide*. The following menu information refers only to configuration of 622 Modules.



## Accessing the Interface Card Menu

The 622 Module is configured by means of the Interface Card Menu of the CoreBuilder 7000HD Local Management software. After the Main Menu is accessed, its SYS submenu leads to the IFC Menu, where the five functions described above may be performed.

In the following example, the 622 Module is installed in the ATM I/F Carrier in slot #3. Beginning with the CoreBuilder switch Main Menu, first verify that the software version is 3.5 or above. Select (8) VER as displayed below:

```
CB7000 switch module - Main Menu:
(1) SYS: Platform config ->
(2) LEM: Lan Emulation ->
(3) CON: Connections ->
(4) STS: Statistics ->
(5) DIA: Testing & Diagnostics ->
(6) FTR: ATM features
(7) LOG: Logout
(8) VER: Version
(9) FST: Fast Setup
[ '\ ' -Main,      '- ' -Back in menus]
[ '=0'-To switch, '=n'-To i/f card n (1-4)]
>8
```

The CoreBuilder version is displayed as follows. Verify that the “Switch Management version” number is at least 3.2.

```
CoreBuilder version:
Switch Management version:      3.5
Internal Communication version:  2.1
Interface Control Card 2 version: 3.1
4PB FPGA transmit version:      1.0
4PB FPGA receive version:       2.3
8PB FPGA transmit version:      1.2
8PB FPGA receive version:       1.2
622 FPGA receive version:       1.0
DATE\TIME
```

Press 'x' Enter to return to the Main Menu and then select (1) SYS. The Platform Configuration menu is displayed as follows:

```

CB7000 switch module - Platform config Menu:
(1) SET: Switch setup ->
(2) RES: Reset config to factory defaults
(3) LOA: Load system software ->
(4) SWM: Switch modules
(5) IFC: Interface cards ->
(6) PWS: Power supplies
(7) RBO: Reboot
[ '\ ' -Main,      '-' -Back in menus]
[ '=0'-To switch, '=n'-To i/f card n (1-4)]
(1)SYS>5

```

Now select (5) IFC. The Interface Card slot installation information is displayed followed by the Interface Card selection menu.

Slot id	Slot status	I/F card type	I/F card status
-----	-----	-----	-----
3	Occupied	ATM I/F Carrier I/F card Up	
4	Occupied	8 port ATM I/F card	Up
5	Free		Not exist
6	Free		Not exist

```

CB7000 switch module - Interface cards Menu:
(1) IF1: Interface card 1 ->
(2) IF2: Interface card 2 ->
(3) IF3: Interface card 3 ->
(4) IF4: Interface card 4 ->
[ '\ ' -Main,      '-' -Back in menus]
[ '=0'-To switch, '=n'-To i/f card n (1-4)]
(1)SYS\ (5)IFC>1

```

The display shows that slot 3 is occupied by a ATM I/F Carrier Module.

In the Interface cards Menu select (5) IFC>1 to display the characteristics of the ports of the first interface card.

```

Interface card HW version is 5
If  Physical      Media      Operational  Admin    Frame Clock
id  type          type          status       status   type  mode
-----
3.1 OC-12-SC      Multi mode fiber  Up          Enabled  SONET Intern
3.2 OC-12-SC      Single mode fiber short Up          Enabled  SONET Intern

```

The parameters of the Interface Card appearing in the previous display are described in Table 8-1. The Interface Card parameter display is followed by the Interface Card configuration menu for the selected Interface Card. It is discussed in the next section.

**Table 8-1** Interface parameters

Parameter	Description
If id	Specifies the port ID number for each of the card's two ports.
Physical Type	Specifies the port interface type (for example, 622-SC). The type determines the interface including the type of connector.
Media Type	Specifies the type of fiber used by the port (for example, coaxial cable, single-mode fiber, multi-mode fiber).
Operational Status	The port may be "up" (enabled) or "down" (disabled), connected or not.
Admin Status	Can be either enabled or disabled.
Frame Type	Specifies the interface mode: can be either SDH or SONET for OC-3 and 622 Module.
Clock Mode	This may be "internal" or "external". When "internal", the transmit (Tx) line uses an internal clock, and when "external" it uses the receive (Rx) line recovered clock.

## The ATM I/F Carrier Configuration Menu

The ATM I/F Carrier configuration menu for the selected Interface Card is displayed as shown in the following screen. You can choose any of five options: Eif, Dif, INI, SPM and STM for any individual port. You will be prompted for the ID(s) of the ports whose settings you wish to change.

```
CB7000 switch module - Interface card 1 Menu:
(1) Eif: Enable interface
(2) Dif: Disable interface
(3) INI: Reinit interface
(4) SPM: Set & save interface mode
(5) STM: Set & save clock operational mode
(6) RSE: Read IFC technical information
[ '\ ' -Main,      '-' -Back in menus]
[ '=0'-To switch, '=n'-To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1>1
```

**Eif:** Enables port(s) - to enable or disable a 622 Module port.

**Dif:** Disables port(s) - if you wish to shut down a 622 Module port.

**INI:** Re-initializes port(s) - to reload a port's FPGA or reinit in cases of failure.

**SPM:** Allows setting and saving the port's interface mode as SDH (0) or SONET (1).

**STM:** Allows setting and saving the port's clock operational mode as internal (0) or external (1).

## Enabling an Interface

This is the first option in the Interface Card Menu and is invoked by typing in the character "1" following the prompt. The system then prompts for an interface ID and responds to this input with appropriate messages and reports.

```
(1)SYS\ (5)IFC\ (1)IF1>1
Enter parameter(s): 'Port number <slot.port>'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (1)Eif>>3.2
Port <3.2> is already enabled
```

### Disabling an Interface

This is the second option in the Interface Card Menu and is invoked by typing in the character “2” following the prompt. The system then prompts for an interface ID and responds to this input with appropriate messages and reports.

```
(1)SYS\ (5)IFC\ (1)IF1>2
Enter parameter(s): 'Port number <slot.port>'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (1)Dif>>3.2

Disable port completed successfully
```

### Re-initializing an Interface

This is the third option in the Interface Card Menu and is invoked by typing in the character “3” following the prompt. The system then prompts for an interface ID and responds to this input with appropriate messages and reports.

```
(1)SYS\ (5)IFC\ (1)IF1>3
Enter parameter(s): 'Port number <slot.port>'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (1)Dif>>3.2

Reinit port completed successfully
```

### Setting and Saving Interface Mode

This is the fourth option in the Interface Card Menu and is invoked by typing in the character “4” following the prompt. The system then

prompts for interface ID(s) and responds to this input with appropriate messages and reports.

```
(1)SYS\ (5)IFC\ (1)IF1>4
Enter parameter(s): 'Port number(0.0 - For all)',
                  'Mode(0- SDH, 1- SONET)'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (4)SPM>>0.0

Parameters: 'Port number(0.0 - For all)' - '0.0'

Enter parameter(s): 'Mode(0- SDH, 1- SONET)'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (4)SPM>>1

Setting interface mode for port <3.1> completed successfully
Setting interface mode for port <3.2> completed successfully
```

### Setting and Saving Clock Operational Mode

This is the fifth option in the Interface Card Menu and is invoked by typing in the character “5” following the prompt. The system then prompts for interface ID(s) and responds to this input with appropriate messages and reports.

```
(1)SYS\ (5)IFC\ (1)IF1>5
Enter parameter(s): 'Port number(0.0 - For all)',
                  'Mode(0- Internal, 1- External)'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (5)STM>>0.0

Parameters: 'Port number(0.0 - For all)' - '0.0'

Enter parameter(s): 'Mode(0- Internal, 1- External)'
[ '\ ' -Main, '-' -Back in menus, '<' -Prev in params, '>' -Begin of params]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
(1)SYS\ (5)IFC\ (1)IF1\ (4)SPM>>0

Setting clock operational mode for port <3.1> completed successfully
Setting clock operational mode for port <3.2> completed successfully
```

---

## CoreBuilder 7000 Integrated Fast Setup

The CoreBuilder 7000HD Switch local management software features an Integrated Fast Setup procedure which configures both the Switch and all Interface Cards installed in it in one continuous dialog. This procedure lets you make the logical connections that enable the 622 Module to function as part of the network.

In this section, only that part of the Integrated Fast Setup will be shown that is relevant to setting up the 622 Module. For additional information about Integrated Fast Setup please refer to the CoreBuilder 7000HD switch unit documentation.

The Integrated Fast Setup procedure is based on a concept in which the CoreBuilder 7000HD Switch together with its installed interface cards is viewed as an integrated unit or *box*. The procedure automatically determines the ports that are available in the box and presents them by type (Ethernet, Fast Ethernet, ATM) for configuration. The port location is displayed by the notation <slot.port>. For example <3.1> refers to slot #3, port #1.

### Setup Modes

The Integrated Fast Setup provides two setup modes: the “Full” setup mode and the “Switch” setup mode.

#### Full Setup Mode

The Full setup mode configures both the CoreBuilder 7000 Switch and the installed Interface Cards. It sets the required parameter values in all the installed Interface Cards and is the preferred setup mode for most users.

#### Switch Setup Mode

The Switch setup mode focuses only on the CoreBuilder 7000 Switch and its ATM ports without altering Interface Card configuration. The Switch setup mode is provided to allow you to retain special settings in the Interface Cards.

#### Setup Mode Selection

If any of the settings in the following list are present in any Interface Card, the operator is prompted to choose between the Switch and Full setup modes:

- A Subnet Mask, Default Gateway or NMS Address different from that of the CoreBuilder 7000 Switch



- A vLAN whose ATM connection is set to "No"
- The name of the ELAN that the default admin port (Port #1 in each slot) is attached to differs from the name "admin"

If Full setup is selected, the parameters in the Interface Cards revert to their default values.

If none of these situations are detected the Full setup mode is executed automatically.

### Setting Special Parameters

In case one or more individual Interface Cards requires one of the special situations referred to in the previous section or needs to remain unaltered, do one of the following:

- Use the Switch setup mode of the Integrated Fast Setup to set up the CoreBuilder 7000 Switch only and then use the Multi-context Fast Setup of each installed Interface Card separately.
- Use the Full setup mode of the Integrated Fast Setup to configure the CoreBuilder 7000 Switch and all installed Interface Cards and then use the Multi-context Fast Setup for the particular Interface Card in order to restore its special parameter values.

Setup Procedure Sections

The Integrated Fast Setup consists of the following steps or sections. Relevancy of the section to the 622 Module is indicated.

Table 8-2 Integrated Fast Setup Procedure Sections

Setup Section	Relevant to 622 Module
Network Prefix	No
LE Parameters	No
LECS Address	No
UNI/NNI parameters	Yes
LE Client Configuration	No
Virtual Network Configuration	No
Admin VN Management Configuration	No
Confirmation	Yes

Navigation Aids

The following characters enable movement through sections of the setup procedure:

Table 8-3 Setup Procedure Navigation Aids

Type:	To perform:
<	Jump to previous section.
>	Jump to next section.
>S	Jump to section according to double underlined ID letter in section title.
\	Jump to beginning of setup.
\$	Jump to end of setup.
}G	Jump to slot #G (in VN Configuration section).
+I	Jump to port #I (in VN Configuration section).
*	Update and duplicate to all slot items (in VN Configuration section).
**	Update and duplicate to all section items (in VN Configuration section).

## Integrated Fast Setup Operation

The Integrated Fast Setup is initiated from the LMA Main Menu of the CoreBuilder 7000HD. The CoreBuilder Main Menu appears as follows:

```
CB7000 switch module - Main Menu:
(1) SYS: Platform config ->
(2) LEM: Lan Emulation ->
(3) CON: Connections ->
(4) STS: Statistics ->
(5) DIA: Testing & Diagnostics ->
(6) FTR: ATM features
(7) LOG: Logout
(8) VER: Version
(9) FST: Fast Setup
[ '\ ' -Main,      '- ' -Back in menus]
[ '=0' -To switch, '=n' -To i/f card n (1-4)]
```

Select the menu item: (9) FST: Fast Setup

**Example Dialog** The following dialog appears on the screen:

```
Now reading the modules configuration, please wait ...

Special module configuration will be overridden by fast setup.
continue full fast setup or only switch fast setup (S<witch>, F<ull>): F

***Note: Full fast setup, special module configuration will be overridden.

Fast Setup Utility
=====

The flash configuration will be displayed below;
Update if needed, and then hit Enter.

To move between sections, enter the following characters at end of line:
< > - Back and forth in sections          >S - Jump to section ID S
\    - Back to beginning of setup          $ - To end of setup

Only in Virtual Network Configuration section (group=slot; item=port):
}G - Jump to group #G                      +I - Jump to item #I
* - Update all group items                  ** - Update all section items
```

### UNI/NNI Parameters Section

The UNI/NNI parameter refers to the role or *profile* that a port of the CoreBuilder 7000 assumes in the network interface between it and the ATM device attached to that port. There are three possibilities: UNI, NNI, and GWY.

- UNI - the port is connected to another CoreBuilder 7000 and assumes a user profile. The other CoreBuilder 7000 assumes a network profile.
- NNI - the port is connected to an ATM end user or to another CoreBuilder 7000 and assumes a network profile. The other device assumes a user profile.
- GWY - the port is connected to an ATM device of another vendor and assumes a gateway profile.

The following screen illustrates the assignment of the UNI/NNI parameters to each port. This is the only section directly relevant to the 622 Module. An ATM I/F Carrier is installed in slot #3; it appears on ports <3.1> and <3.2> as shown below. The other slots contain 8-Port Boards without any 622 Modules installed.

```
UNI/NNI parameters
=====
NNI max hops (0 - 120): 7
NNI type of port <3.1> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <3.2> (U<NI>, N<NI>, G<ateway>): G
NNI type of port <4.1> (U<NI>, N<NI>, G<ateway>): G
NNI type of port <4.2> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <4.3> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <4.4> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <4.5> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <4.6> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <4.7> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <4.8> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <5.1> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <5.2> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <5.3> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <5.4> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <5.5> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <5.6> (U<NI>, N<NI>, G<ateway>): N
NNI type of port <5.7> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <5.8> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <6.1> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <6.2> (U<NI>, N<NI>, G<ateway>): G
NNI type of port <6.3> (U<NI>, N<NI>, G<ateway>): G
NNI type of port <6.4> (U<NI>, N<NI>, G<ateway>): G
NNI type of port <6.5> (U<NI>, N<NI>, G<ateway>): G
NNI type of port <6.6> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <6.7> (U<NI>, N<NI>, G<ateway>): U
NNI type of port <6.8> (U<NI>, N<NI>, G<ateway>): U
```

## Confirmation Dialog Section

The final confirmation dialog appears as follows:

```
Accept Changes
=====
*** Note: Change of some parameters will take affect now!!

    Save changes (Y/N)? Y
    Are you sure (Y/N)? y
    Saving NMS parameters...
    Saving LE parameters...
    Saving Network Prefix...
    Saving resident LECS Address...
    Saving active LECS Address...
    Saving NNI parameters...
    The switch new configuration has been saved.

    Now applying the module in slot #4 ...

    Due to new VN configuration, some saved static
    entries in slot #4 have been invalidated.

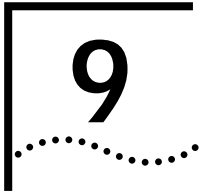
    The new VN configuration in slot #4 has been applied and saved.

    Now applying the module in slot #5 ...

    Due to new VN configuration, some saved static
    entries in slot #5 have been invalidated.

    The new VN configuration in slot #5 has been applied and saved.

    All the modules new configuration has been applied.
```



# ATM-LAYER PROCESSING

This chapter describes the operation of the ATM I/F Carrier ATM-layer processor when the ATM I/F Carrier is installed in a CoreBuilder 7000HD switch unit. The following topics are discussed:

- Splitting ATM Data Streams
- ATM-Layer Conversion
- Traffic Management Basics
- Traffic Management in the ATM I/F Carrier
- Traffic Management in the 622 Module

---

## Splitting ATM Data Streams

The CoreBuilder 7000HD high-density switch unit processes ATM data at a rate of 310 Mbps. The 622 Module was specially designed to provide an interface between full-rate line data flow at 622 Mbps and the CoreBuilder 7000HD unit. It can accept data from the line at 622 Mbps and transmit it to the CoreBuilder 7000HD unit at full rate.

This task is performed by the 622 Module unit in the ATM I/F Carrier. It accepts ATM input data from its port and then splits the data into two special ATM data channels called *pipes*. Each pipe carries ATM data at 310 Mbps.

The two pipes bring the ATM data to the ATM-layer processor of the ATM I/F Carrier and then to the SRE\_L Matrix of the CoreBuilder 7000HD for further processing. The SRE\_L Matrix is able to accept ATM data from 16 pipes simultaneously. Since two pipes corresponds to one physical 622 Module port, as explained above, the SRE\_L Matrix can handle the input from eight 622 Modules simultaneously, that is, when the CoreBuilder 7000HD is fully populated by ATM I/F Carriers. Figure 9-1 shows these pipes between the physical ports of the 622

Module (shown vertically on the left) and the SRE\_L Matrix of the CoreBuilder 7000HD.

Output ATM data is handled in the reverse sequence: ATM data coming in on two pipes from the CoreBuilder 7000HD switch board to the ATM I/F Carrier is multiplexed by the 622 Module into one output channel and routed to a port of a 622 Module.

Figure 9-2 shows how the 622 Module splits the input data stream and multiplexes the output data streams.



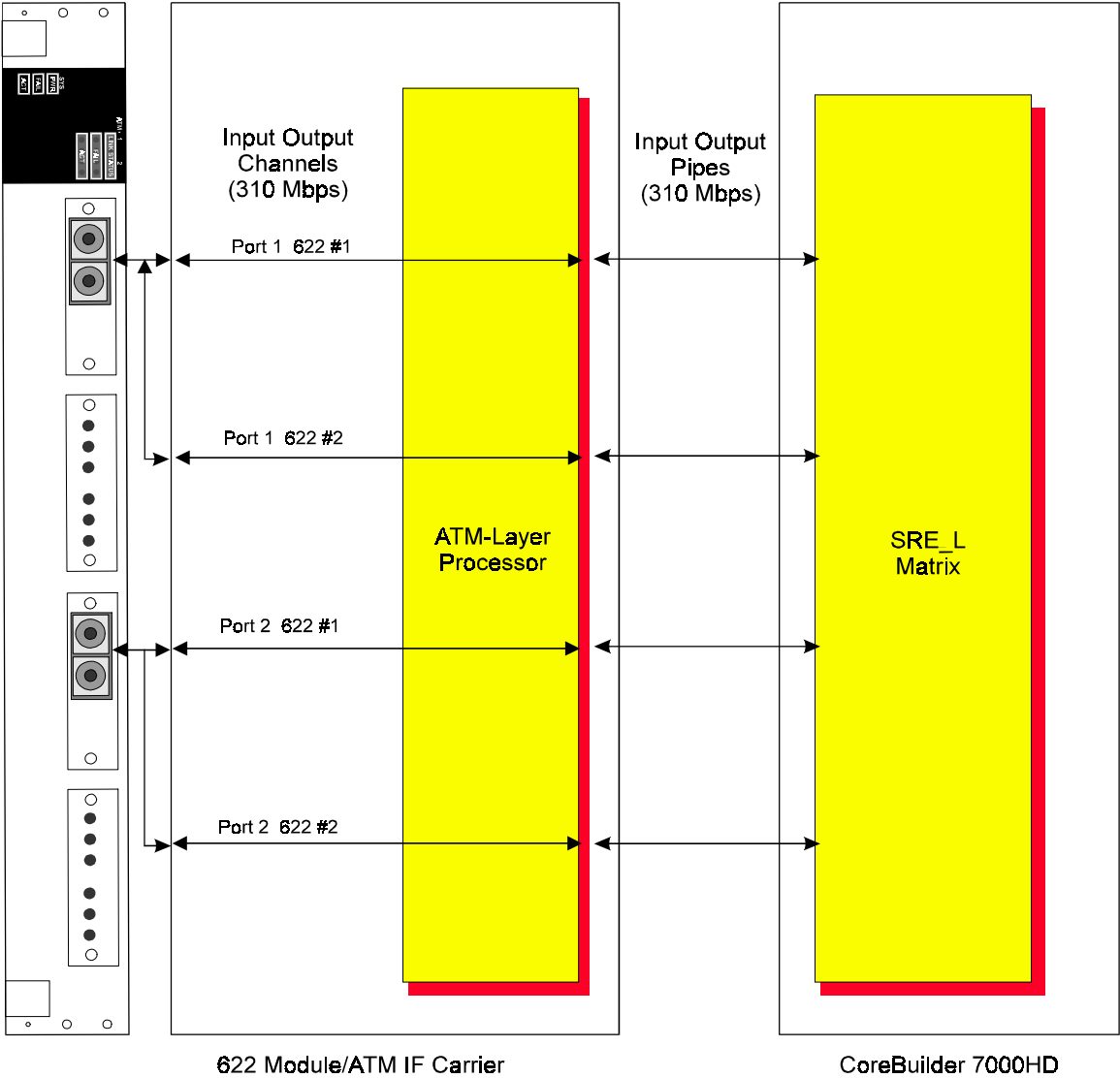


Figure 9-1 Pipes in the 622 Module/ATM IF Carrier

---

**ATM-Layer  
Conversion**

Another task of the ATM-layer processor is to encode and decode ATM-layer data into an internal format which is used by the CoreBuilder switch unit. It also performs the following specific tasks.

- Header Manipulation
- VPI/VCI Range Support & Per VC Statistics

**Header Manipulation**

The ATM layer processor allows full header processing - VPI, VCI, CLP, PTI, and GFC fields on both the input and output. The processing allows setting and clearing specific bits within the header.

**VPI/VCI Range  
Support & Per VC  
Statistics**

VPI and VCI are allocated according to mode. For VP switching and tunnelling, more VPI bits are allocated, and for end user connectivity more VCI bits are allocated. The total per port is 4096 VPCI. In addition, the ATM I/F Carrier is able to maintain per VC statistics.

---

**Traffic  
Management Basics**

ATM technology is intended to support a wide variety of services and applications. Each type of application, whether it be voice, video or data, has its own special data transmission performance requirements. These requirements are expressed in a set of parameters called *Quality of Service* (QoS) which includes such factors as permissible transmission delay and loss of information. An important task of the ATM network is to be able to provide the appropriate QoS requirements for each application it is carrying. Traffic Management is provided on the ATM network to protect the network and the end-system from congestion in order to achieve network performance objectives. An additional role is to promote the efficient use of network resources. TM allows the devices to transmit over a broader bandwidth for longer periods of time, making the network more efficient.

**Closed-loop Control  
Methods**

Different methods are used to support Traffic Management. Many of them work on a closed-loop feedback control principle where congestion is sensed at some point in the network and a control signal is sent back in order to limit the traffic at its source.

In the 622 Module/ATM IF Carrier several feedback methods are used. These methods operate internally between the 622 Module/ATM IF Carrier and the CoreBuilder 7000HD switch unit in which it is installed.

They include Early Packet Drop (EPD), Tail Drop (TD) and Back Pressure Cell Storage. These methods are discussed below.

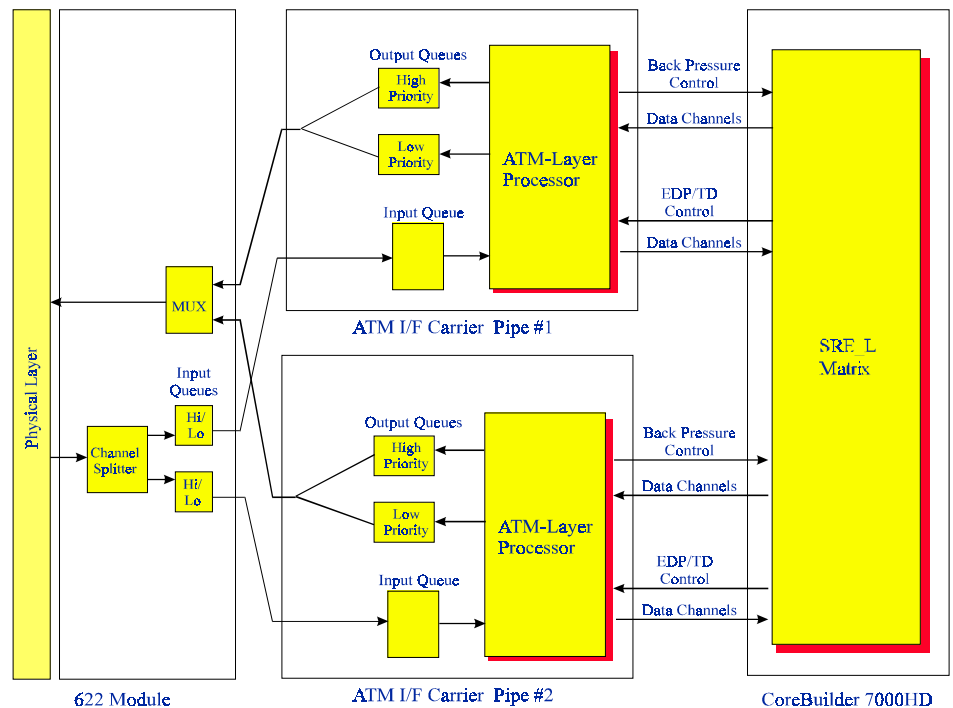
## Traffic Management in the ATM I/F Carrier

One of the most powerful features of the ATM I/F Carrier is its ability to work with the CoreBuilder 7000HD switch unit to handle traffic congestion and minimize loss of high priority data. The ATM I/F Carrier provides several key mechanisms to achieve this end:

- Priority Output Buffers
- Back Pressure Cell Storage
- Early Packet Drop (EPD)
- Tail Drop (TD)

## Traffic Management Hardware

The hardware units responsible for traffic management are the ATM-Layer processor in the ATM I/F Carrier and the SRE\_L Matrix in the CoreBuilder switch unit. The traffic management control flow between the two is shown in Figure 9-2.



**Figure 9-2** Traffic Management Control Flow

**Output Data Loss Prevention**

Because of the high data-transfer rates of the CoreBuilder 7000HD switch unit, which exceeds the line rate of 622 Mbps, it can happen momentarily that the output data cannot be handled by the line interface system. Several safeguards are provided to prevent loss of output data in this situation.

- Priority Output Buffers
- Back Pressure Cell Storage

**Priority Output Buffers**

One primary way in which the ATM I/F Carrier controls output data loss is by prioritizing the output data. A data frame for which certain losses or delays in transmission could be tolerated according to its QoS is designated as lower priority data. For example, voice data is sensitive to loss and jitter, and is therefore classified as high-priority data. The ATM-Layer processor assigns priorities to cells according to a frame priority decision made by software. Some priority decisions are also taken at an earlier stage in the SRE\_L Matrix.

Referring to Figure 9-2, loss of high priority data is minimized by maintaining two output buffers for each port, corresponding to high and low priority. The ATM-layer processor routes the high-priority data to the high-priority buffer and the low-priority data to the low-priority buffer.

The high-priority data is always transmitted out before the low priority data so that, in case of congestion, it is the low priority data which will overflow and be lost first.

**Back Pressure Cell Storage**

Back Pressure Cell Storage is another method of controlling loss of output data. It is designed to handle the situation in which the dual output buffers described in the previous section overflow and thus provides an extra protection against loss of output data.

The ATM-Layer processor senses overflow of the output buffers and sends a control signal (Back Pressure Control" on Figure 9-2) to the SRE\_L Matrix unit of the CoreBuilder 7000HD. The SRE\_L Matrix unit then stops transferring cells to the ATM I/F Carrier and begins storing them in its own internal buffer which has a capacity of 600 cells. When it receives a signal that the output buffers have emptied it releases the stored cells.

## **Input Data Loss Prevention**

The ATM I/F Carrier also provides safeguards against loss of input data. In this situation it is the CoreBuilder 7000HD switch fabric which becomes congested and therefore cannot accept input data coming on the pipes from the ATM-layer processor of the ATM I/F Carrier. Two mechanisms are provided to control loss of input data:

- Early Packet Drop
- Tail Drop

### **Early Packet Drop**

Early Packet Drop (EPD) is a way of reducing traffic congestion in the SRE\_L Matrix by intentionally removing low-priority packets from the incoming data stream. EPD is a loss-prevention system since it is activated before congestion has reached the stage that data is being lost. EPD is also a more efficient system from the point of view of the network than the TD system described below since whole packets are dropped, beginning from the first cell.

This method works as follows: Referring to Figure 9-2, congestion is sensed by the SRE\_L Matrix unit of the CoreBuilder 7000HD. An EPD signal is sent back to the ATM-Layer processor (shown in the figure as “EPD/TD Control”) and the ATM-Layer processor drops whole frames according to a frame priority data base initialized by software. Different buffer level thresholds are enabled for EPD according to the different QoS required.

### **Tail Drop**

Tail Drop (TD) also serves the purpose of reducing traffic congestion by dropping incoming data frames, except that it is employed when congestion has already reached the state that cells are being lost. This method is also known as Tail Drop (TD) since the “tail” or remainder of the corrupted frame is dropped.

This method works as follows: Referring to Figure 9-2, cell-loss in an ATM data frame incoming from the ATM-layer processor is sensed by the SRE\_L Matrix unit of the CoreBuilder 7000HD. A TD signal is sent back to the ATM-Layer processor (shown on the Figure as “EPD/TD Control”) and the ATM-Layer processor drops the remainder of the frame. Different buffer level thresholds are enabled for TD according to the different QoS required.

---

## Traffic Management in the 622 Module

As mentioned above (“Splitting ATM Data Streams” on page 9-1) the 622 Module accepts ATM input data from its port and then splits the data into two special ATM data channels called *pipes*. Each pipe carries ATM data at 310 Mbps.

### Bandwidth Limitation

The splitting of input data into pipes can cause some limiting of bandwidth. The amount of bandwidth limitation which occurs depends primarily on how many calls are incoming simultaneously. The reason is that an individual call cannot be split between pipes. For example, if only one call is entering at 622 Mbps, it must be wholly routed through one pipe and the bandwidth will be limited to 310 Mbps. However, if two calls are entering simultaneously at 622 Mbps, one call would be routed through one pipe and the second call through the second pipe, with a much smaller limitation of bandwidth.

### Handling Burst Transmissions

Due to this architecture, the 622 Module in a ATM I/F Carrier cannot handle a continuous input at 622 Mbps. In order to prevent such a situation from occurring, the host CoreBuilder notifies the other switches connected to it that it is *bandwidth-limited*. Then, any switch that has the capability of transmitting at 622 Mbps will limit itself to transmitting at that rate only for short durations, that is, burst transmissions.

Burst data can be handled by the 622 Module; there are several mechanisms which enable it to do so.

- Priority Input Buffers
- Tail Drop in the 622 Module

### Priority Input Buffers

One way in which the 622 Module controls input data loss is by prioritizing the input data. A data frame for which certain losses or delays in transmission could be tolerated according to its QoS is designated as lower priority data; other more sensitive data would be designated as high priority data. For example, voice data is sensitive to loss and jitter, and is therefore classified as high-priority data. The 622 Module processor assigns priorities to cells according to a frame priority decision made by software.

Loss of high priority data is minimized by maintaining two input buffers, corresponding to high and low priority. The 622 Module processor routes the high-priority and low-priority input data to their respective buffers.

The data in the high-priority buffer is always transmitted before the data in the low priority buffer so that, in case of congestion, it is the low priority buffer which will overflow first.

The size of the input buffers are:

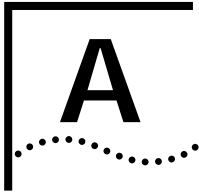
- High priority - 300 cells per VC, for a total of 600 cells
- Low priority - 1200 cells per VC, for a total of 2400 cells

## 622 Module Tail Drop

Tail Drop (TD) in the 622 Module serves the purpose of reducing traffic congestion by dropping incoming data frames. It is employed when congestion has already reached the state that the input buffers are overflowing, cells are being lost and the frame is corrupted. This method is known as Tail Drop (TD) since the "tail" or remainder of the corrupted frame is dropped.

This method works as follows: Cell-loss in an incoming data frame is sensed by the Rx FPGA unit of the 622 Module which then removes the rest of the frame. This way the input buffers are cleared of corrupted frames, making room for the others. Different buffer level thresholds are enabled for TD according to the different QoS required.

The Tail Drop feature can be activated selectively per VPI/VCI channel or, alternatively, for all channels of the 622 Module.



# 622 MODULE SPECIFICATIONS

---

## Physical

### 622 Mbps ATM Interface Module

- Height            1¾ in      4.5 cm
- Width            17 in      14.5 cm
- Depth            11 in      17.5 cm
- Weight           3.3 lb      140 g

### ATM I/F Carrier Module

- Height            1¾ in      4.5 cm
- Width            17 in      39.5 cm
- Depth            11 in      23.5 cm
- Weight           ±3.3 lb    ±1.5 kg

---

## Interfaces

- ATM
- The following types of 622 interfaces are available:
  - OC12-MM (622 Mbps)
  - OC12-SM (622 Mbps), short-reach
  - OC12-SM (622 Mbps), long-reach



---

**ATM Switching**

- Standard LAN Emulation
- SVC signaling in compliance with UNI 3.0/3.1
- Congestion Management
- Rate-based Flow Control

---

**Environmental**

- Operating Temperature: 32 - 104° F (0-40° C)
- Operating Humidity: 10% -90% noncondensing
- Storage Temperature: -4 to 163° F (-20 - 70° C)
- Storage Humidity: 10% -90% noncondensing

---

**Indicators**

- ATM Ports – per-port Link Status, Fail, and Activity
- System – Power, Fail, Activity

---

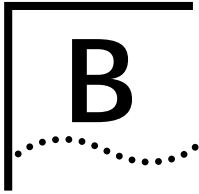
**Standards  
Compliance****Safety**

- UL 1950
- CSA 22.2 No 1950
- EN 60950
- IEC 825-1 (Equipment classification, requirements and user's guide)
- IEC 825-2 (Safety of optical fiber communication systems)
- PCB UL flammability rating of 94V-0
- PCB fabrication as per ANSI/IPC-RB-276, class 2 (General Industry)
- Should be able to carry the CE mark

**Electromagnetic  
Emissions (Agency  
Certifications)**

- Meets FCC part 15, Subparagraph B, Class A limits, and CISPR-22 Class A limits.
- Directive complied with: EMC 89/336/EEC as amended by 92/31/EEC and 93/68/EEC.
- Emission: EN50081-1 (EN55022 Class B)
- Immunity: EM50082-1 (IEC801-2,-3,-4)

Communications Protocols	RFC 826 ARP, RFC 791 IP, RFC 792 ICMP, RFC 768 UDP, RFC 793 TCP
Management Protocols	RFC 1157 SNMP, RFC 1213 MIB2, RFC 1212 Concise, RFC 1212 Traps, RFC 1695 AToM MIB.



# TROUBLESHOOTING

This appendix explains how to identify and correct problems, and how to perform related diagnostic tasks, such as replacing fuses and cleaning fiber optic cables.

If you have problems that are not addressed in this chapter, contact 3Com Technical Support or your service person. For Technical Support information, see *Appendix C: Technical Support*.

---

## Solving Common Problems

Following are common problems which may arise while working with the 8-Port Board or the ATM I/F Carrier. If your problem does not appear on this list, you may want to view relevant statistics and parameters using the Administration Console menus (refer to *CELLplex 7000 Administration Guide*). You can also contact 3Com Technical Support or your service person (refer to Appendix C). Also, be sure to read through the release notes.

### Port Cables Do Not Work

If the cables attached to the 8-Port Board or ATM I/F Carrier ports do not work, check that the connectors are firmly snapped in place. Also, make sure that each wire connected to the ATM ports connects to Rx on one end and Tx on the other.

### ACT LED Not Blinking

When the CoreBuilder 7000HD is activated, the ACT LEDs on the 8-Port Board or ATM I/F Carrier should be blinking. If not, verify that the module is properly inserted into the chassis of the CoreBuilder 7000HD.

---

## Related Diagnostic Procedures

When troubleshooting for problems, you may have to perform minor procedures to help correct the problem. These procedures are described in the next section. For more complex operations on the 8-Port Board or ATM I/F Carrier, contact your service person.

## Cleaning Dirty Fiber Optic Cables

Fiber optic transceivers are sensitive optical devices that need to be handled carefully. If dirt collects on the fiber optic lens, you may notice that the LED for an ATM port link status does not light. You may also notice degraded performance of that port, indicated by an increase in the physical layer statistics count for that port.

To prevent dust from collecting on the fiber optic lens, keep the dust covers on the ports at all times when they are not in use. To clean a fiber optic lens, perform the following procedure:

- 1 Remove any accumulated dust or debris from the port or connector by blowing off all surfaces with a canned air duster.
- 2 Compressed gas is recommended, such as Chemtronics' Ultrajet<sup>®</sup> or the Triangle Tool Group's Liqui-Too!<sup>™</sup> Dust-A-Way. Do not use commercial compressed air or "house air" because of the risk of oil contamination.
- 3 Reconnect the cable to the port to see if the dusting corrected the problem.
- 4 If the LED still does not appear, or if it lights yellow, continue with steps 5 and 6.
- 5 Gently wipe the ports with a lint-free, nonabrasive, nonadhesive swab. Microswabs<sup>™</sup> by Texwipe<sup>™</sup> are recommended.
- 6 Gently wipe the connectors with a lint-free, nonabrasive wipe or pad. Texwipe<sup>™</sup> pads are recommended.



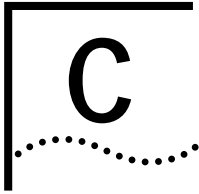
*Avoid touching all surfaces after cleaning the connectors, and keep all unused ports covered.*



*Ne toucher aucune surface après le nettoyage des connecteurs et garder les pièces inutilisées couvertes.*



*Vermeiden Sie das Berühren aller Oberflächen nach dem Säubern der Kontakte und verdecken Sie alle nicht benutzten Öffnungen.*



# TECHNICAL SUPPORT

3Com provides easy access to technical support information through a variety of services. This appendix describes these services.

Information contained in this appendix is correct at time of publication. For the very latest, we recommend that you access 3Com Corporation's World Wide Web site as described below.

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## Online Technical Services

3Com offers worldwide product support 24 hours a day, 7 days a week, through the following online systems:

- World Wide Web site
- 3Com Bulletin Board Service (3ComBBS)
- 3ComFacts<sup>SM</sup> automated fax service
- 3ComForum on CompuServe<sup>®</sup> online service

## World Wide Web Site

Access the latest networking information on 3Com Corporation's World Wide Web site by entering our URL into your Internet browser:

**<http://www.3Com.com/>**

This service features the latest information about 3Com solutions and technologies, customer service and support, news about the company, *NetAge*<sup>®</sup> Magazine, and more.

## 3Com Bulletin Board Service

3ComBBS contains patches, software, and drivers for all 3Com products, as well as technical articles. This service is available through analog modem or digital modem (ISDN) 24 hours a day, 7 days a week.

### Access by Analog Modem

To reach the service by modem, set your modem to 8 data bits, no parity, and 1 stop bit. Call the telephone number nearest you:

Country	Data Rate	Telephone Number
Australia	up to 14400 bps	61 2 9955 2073
Brazil	up to 14400 bps	55 11 547 9666
France	up to 14400 bps	33 1 6986 6954
Germany	up to 28800 bps	4989 62732 188
Hong Kong	up to 14400 bps	852 2537 5608
Italy (fee required)	up to 14400 bps	39 2 27300680
Japan	up to 14400 bps	81 3 3345 7266
Mexico	up to 28800 bps	52 5 520 7853
P. R. of China	up to 14400 bps	86 10 684 92351
Singapore	up to 14400 bps	65 534 5693
Taiwan	up to 14400 bps	886 2 377 5840
U.K.	up to 28800 bps	44 1442 438278
U.S.A.	up to 28800 bps	1 408 980 8204

### Access by Digital Modem

ISDN users can dial in to 3ComBBS using a digital modem for fast access up to 56 Kbps. To access 3ComBBS using ISDN, use the following number:

**408 654 2703**

### 3ComFacts Automated Fax Service

3Com Corporation's interactive fax service, 3ComFacts, provides data sheets, technical articles, diagrams, and troubleshooting instructions on 3Com products 24 hours a day, 7 days a week.

Call 3ComFacts using your Touch-Tone telephone using one of these international access numbers:

Country	Telephone Number
Hong Kong	852 2537 5610
U.K.	44 1442 438279
U.S.A.	1 408 727 7021

Local access numbers are available within the following countries:

Country	Telephone Number	Country	Telephone Number
Australia	1800 678 515	Netherlands	06 0228049
Belgium	0800 71279	New Zealand	0800 446 398
Denmark	800 17319	Norway	800 11062
Finland	98 001 4444	Portugal	0505 442 607
France	05 90 81 58	Russia (Moscow only)	956 0815
Germany	0130 81 80 63	Singapore	800 6161 463
Hong Kong	800 933 486	Spain	900 964 445
Italy	1678 99085	Sweden	020 792954
Malaysia	1800 801 777	U.K.	0800 626403

### 3ComForum on CompuServe Online Service

3ComForum is a CompuServe-based service containing patches, software, drivers, and technical articles about all 3Com products, as well as a messaging section for peer support. To use 3ComForum, you need a CompuServe account.

To use 3ComForum:

- 1 Log on to CompuServe.
- 2 Type **go threecom**
- 3 Press [Return] to see the 3ComForum main menu.

### Support from Your Network Supplier

If additional assistance is required, contact your network supplier. Many suppliers are authorized 3Com service partners who are qualified to provide a variety of services, including network planning, installation, hardware maintenance, application training, and support services.

When you contact your network supplier for assistance, have the following information ready:

- Diagnostic error messages
- A list of system hardware and software, including revision levels
- Details about recent configuration changes, if applicable

If you are unable to contact your network supplier, see the following section on how to contact 3Com.

**Support from 3Com** If you are unable to receive support from your network supplier, technical support contracts are available from 3Com.

Contact your local 3Com sales office to find your authorized service provider using one of these numbers:

Regional Sales Office	Telephone Number
<b>3Com Corporation</b>	
P.O. Box 58145	800 NET 3Com or 1 408 764 5000
5400 Bayfront Plaza	408 764 5001 (fax)
Santa Clara, California	
95052-8145	
U.S.A.	
<b>3Com Asia Limited</b>	
Australia	61 2 9937 5000 (Sydney)
	61 3 9866 8022 (Melbourne)
China	8610 68492568 (Beijing)
	86 21 63740220 Ext 6115 (Shanghai)
Hong Kong	852 2501 1111
India	91 11 644 3974
Indonesia	6221 572 2088
Japan	81 6 536 3303 (Osaka)
	81 3 3345 7251 (Tokyo)
Korea	822 2 319 4711
Malaysia	60 3 732 7910
New Zealand	64 9 366 9138
Phillippines	632 892 4476
Singapore	65 538 9368
Taiwan	886 2 377 5850
Thailand	662 231 8151 4
<b>3Com Benelux B.V.</b>	
Belgium	32 2 725 0202
Netherlands	31 30 6029700
<b>3Com Canada</b>	
Calgary	403 265 3266
Montreal	514 683 3266
Ottawa	613 566 7055
Toronto	416 498 3266
Vancouver	604 434 3266
<b>3Com European HQ</b>	49 89 627320
<b>3Com France</b>	33 1 69 86 68 00

Regional Sales Office	Telephone Number
<b>3Com GmbH</b>	
Austria	43 1 513 4323
Czech Republic/Slovak Republic	420 2 21845 800
Germany	49 30 34 98790 (Berlin)
(Central European HQ)	49 89 627320 (Munich)
Hungary	36 1 250 83 41
Poland	48 22 6451351
Switzerland	41 31 996 14 14
<b>3Com Ireland</b>	353 1 820 7077
<b>3Com Latin America</b>	
U.S. Headquarters	408 326 2093
Northern Latin America	305 261 3266 (Miami, Florida)
Argentina	541 312 3266
Brazil	55 11 546 0869
Chile	562 633 9242
Colombia	571 629 4110
Mexico	52 5 520 7841/7847
Peru	51 1 221 5399
Venezuela	58 2 953 8122
<b>3Com Mediterraneo</b>	
Italy	39 2 253011 (Milan)
	39 6 5279941 (Rome)
Spain	34 1 383 17 00
<b>3Com Middle East</b>	971 4 349049
<b>3Com Nordic AB</b>	
Denmark	45 39 27 85 00
Finland	358 0 435 420 67
Norway	47 22 18 40 03
Sweden	46 8 632 56 00
<b>3Com Russia</b>	007 095 258 09 40
<b>3Com Southern Africa</b>	27 11 807 4397
<b>3Com UK Ltd.</b>	
	44 131 220 8228 (Edinburgh)
	44 161 873 7717 (Manchester)
	44 162 889 7000 (Marlow)



Returning Products  
for Repair

Before you send a product directly to 3Com for repair, you must first obtain a Return Materials Authorization (RMA) number. Products sent to 3Com without RMA numbers will be returned to the sender unopened, at the sender’s expense.

To obtain an RMA number, call or fax:

Country	Telephone Number	Fax Number
U.S.A. and Canada	1 800 876 3266, option 2	408 764 7120
Latin America	1 408 326 2927	408 764 7120
Europe, South Africa, and Middle East	44 1442 438125	44 1442 435822
Outside Europe, U.S.A., and Canada	1 408 326 2926	1 408 764 7120

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